# THE IRON AGE

THURSDAY, JUNE 25, 1891.

## Wright Triple-Expansion Engine.

### General Principle.

It is desirable, when high-pressure steam is used and great power is to be developed, to distribute the work of the engine so that no part has to bear an excessive strain, or the work be unevenly distributed; also that all power in the steam engine be given out before the steam is released, and this can only be done by expanding the steam until its pressure is about 5 pounds above a perfect vacuum.

When the pressure of steam requires only about 20 expansions to absorb its power an ordinary compound engine of two cylinders is all that is required; but when higher pressure of steam is used a great number of expansions is required to obtain this power in the steam. Then it is desirable to have a triple expansion or three-cylinder engine, the small or high-pressure cylinder of such size and cutting off at such a point of the stroke as will contain the quantity of steam to give out the whole of the work required, and at the same time to be so proportioned with regard to the other two cylinders as to have only one-third of the work done by it.

The second cylinder is proportioned to receive and expand the exhaust steam from the first cylinder and do one-third of the whole work.

The third cylinder is proportioned to receive and expand the exhaust steam from the second cylinder, and with the vacuum made by the air pump and condenser to do one-third of the work.

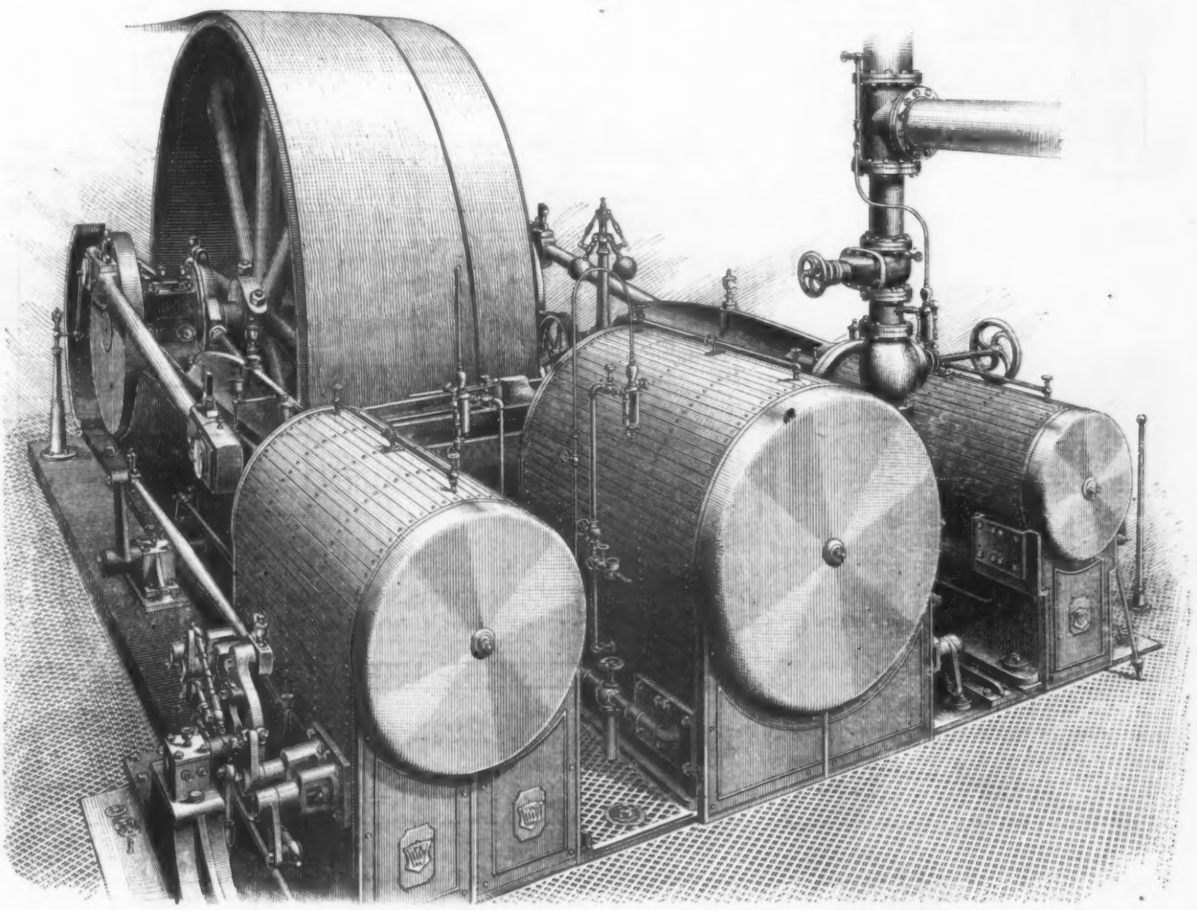
In designing the triple engine, the object is to have the movable and reciprocating parts as light as is practicable and the strains evenly distributed. For land engines it has been the practice to make what is called the tandem style—that is, the three cylinders are placed one behind the other, having all the piston rods on one line, one connecting rod and one crank pin and crank.

The objection to this plan is, the whole work and strain have to be conveyed through the piston rods in the following manner: The first and smallest piston rod conveys one-third of the work to the second rod; this rod, in turn, conveys two-thirds of the work to the third piston rod, which rod has to be strong enough to convey the whole work or power to the crosshead. The crosshead pin and the crank pin have to be large enough to withstand the thrust, and must have sufficient surface to reduce the friction in order to prevent heating. The connecting rod and crank have to be made heavy and strong to convey the power to the shaft. The crankshaft bearings require to be large in diameter and long, to withstand the strain and reduce the friction per square inch of surface to prevent heating, as the whole work or power has to be transmitted through these parts to the main driving pulley.

Another objection to this style is its great length, requiring each cylinder to be placed far enough from the others to allow sufficient space to take off the heads in order to get at the pistons when necessary; and in case the pistons are to be taken out, all of them have to be forced off the rod and taken out between the cylinders. Another objection lies in the difficulty of keeping the cylinders in line. Much time and labor are required when any of the main parts have to be taken apart for examination.

A triple compound arranged as shown on the plan, Fig. 2, has not the objections that exist in the tandem style. The foundation required is less, and the engine being nearly square gives a more solid foundation. The three cylinders being arranged side by side, each having its own piston rod connected to the crosshead, either piston can readily be removed by taking off the back head and disconnecting the piston rod from the crosshead. The cylinders, being bolted to the beds, cannot get out of line, as may happen in the tandem style. As each cylinder exerts the same power, a uniform load is distributed over the crosshead.

The crosshead having a journal at the ends, just outside of the slides, and the outer cylinders having their piston rods connected to the crosshead inside of slides, brings the power applied near the line of resistance. One half of the power of the three cylinders is conveyed to each of the crosshead journals, and through their respective connecting rods to each



TRIPLE EXPANSION ENGINE, BUILT BY WILLIAM WRIGHT.

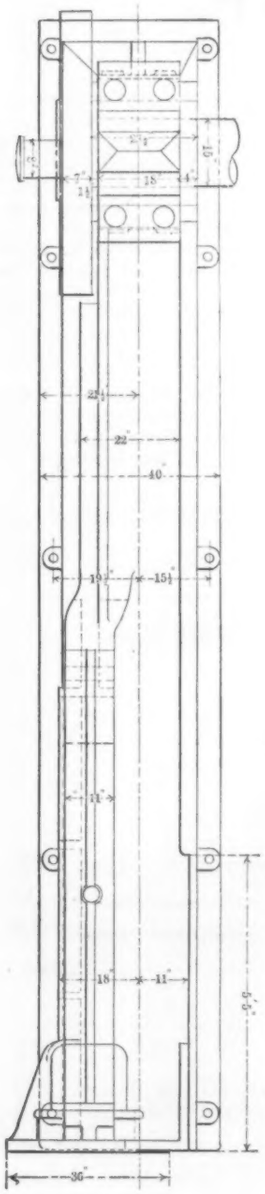



*Fig. 3.—Plan of One Side of Frame.*

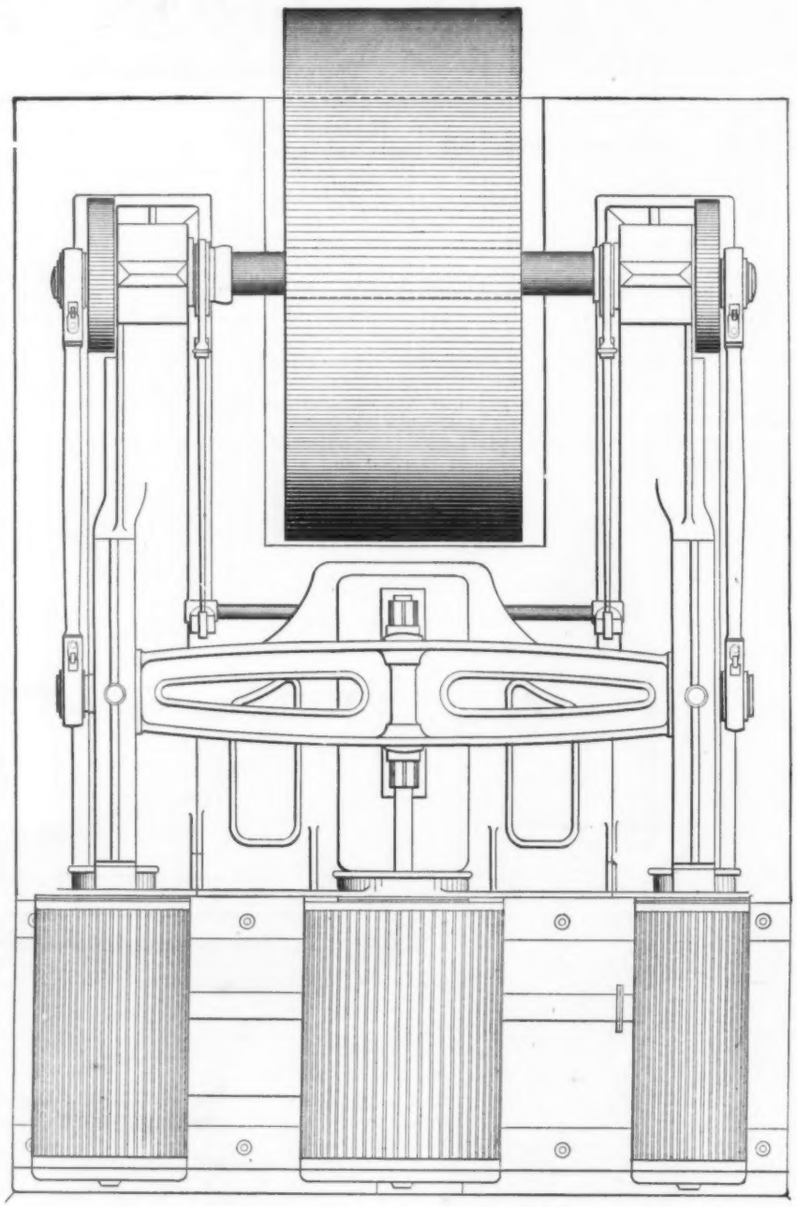


*Fig. 2.—Plan.*

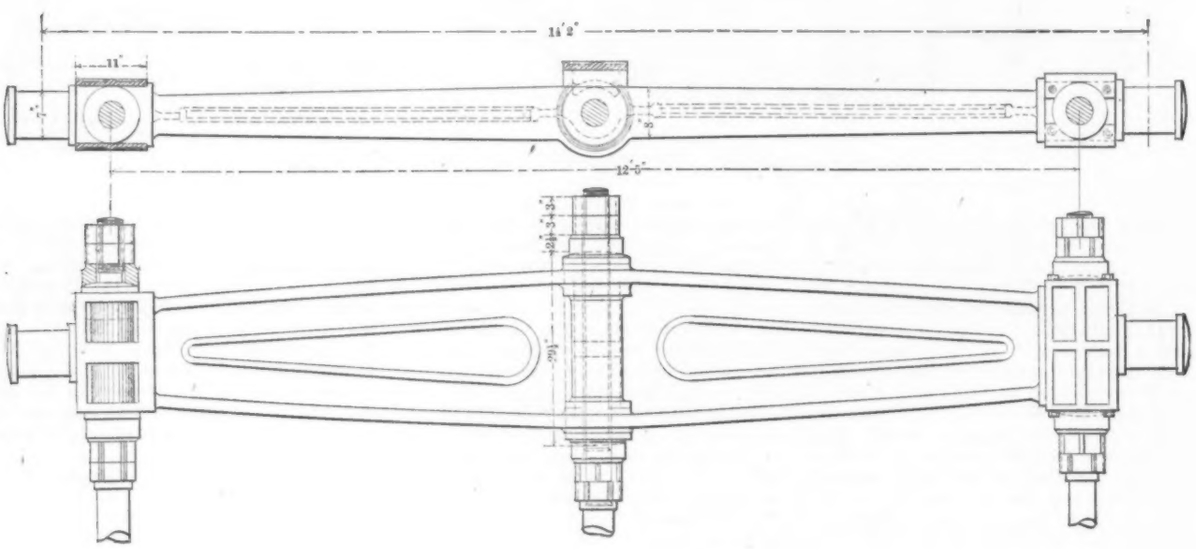



*Fig. 6.—Plan and Section of Cross Head.*

THE WRIGHT TRIPLE EXPANSION ENGINE.

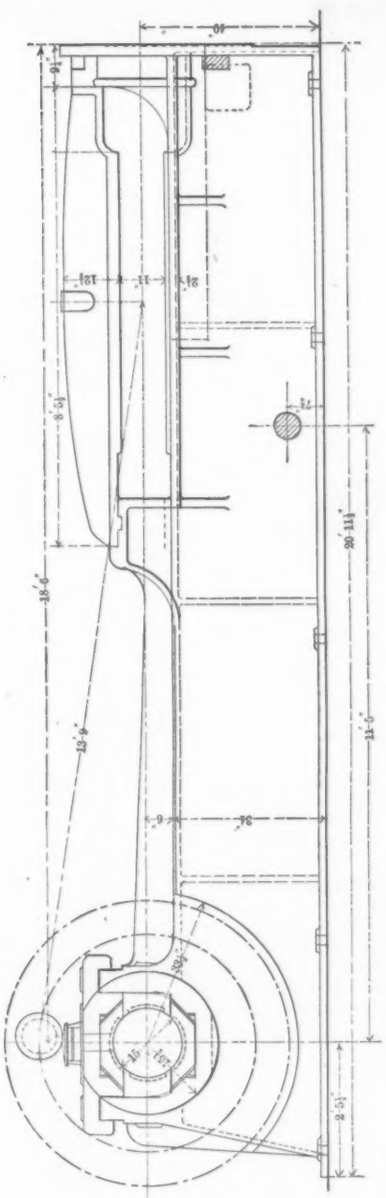


*Fig. 4.—Side Elevation of Frame*

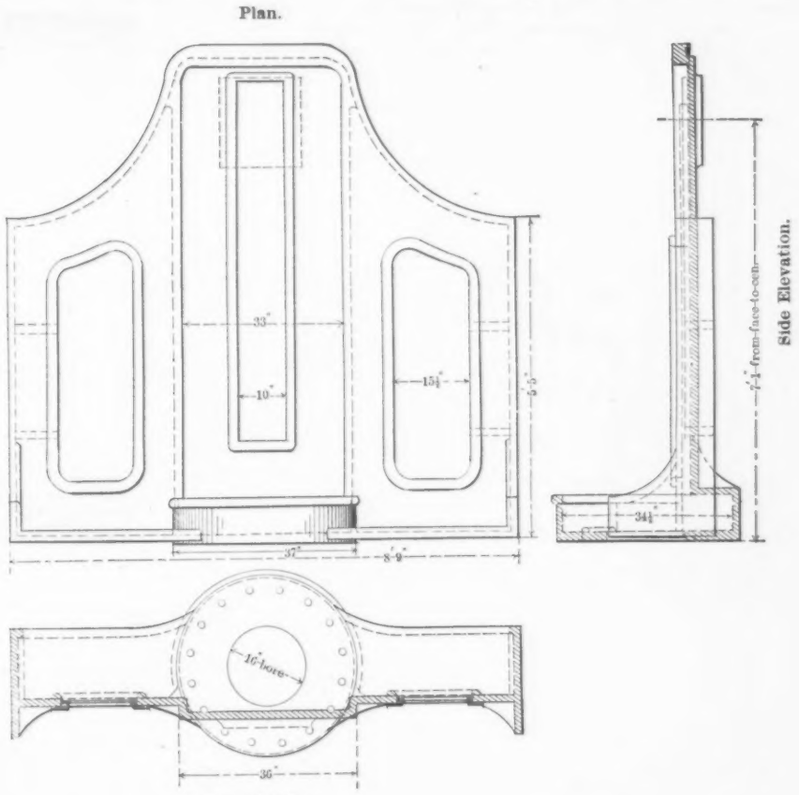



*Fig. 5.—Plan and Elevations of Bracket.*

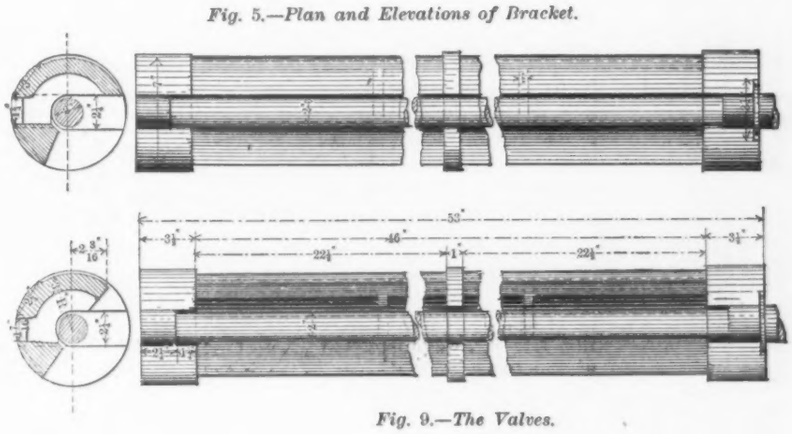


*Fig. 9.—The Valves.*

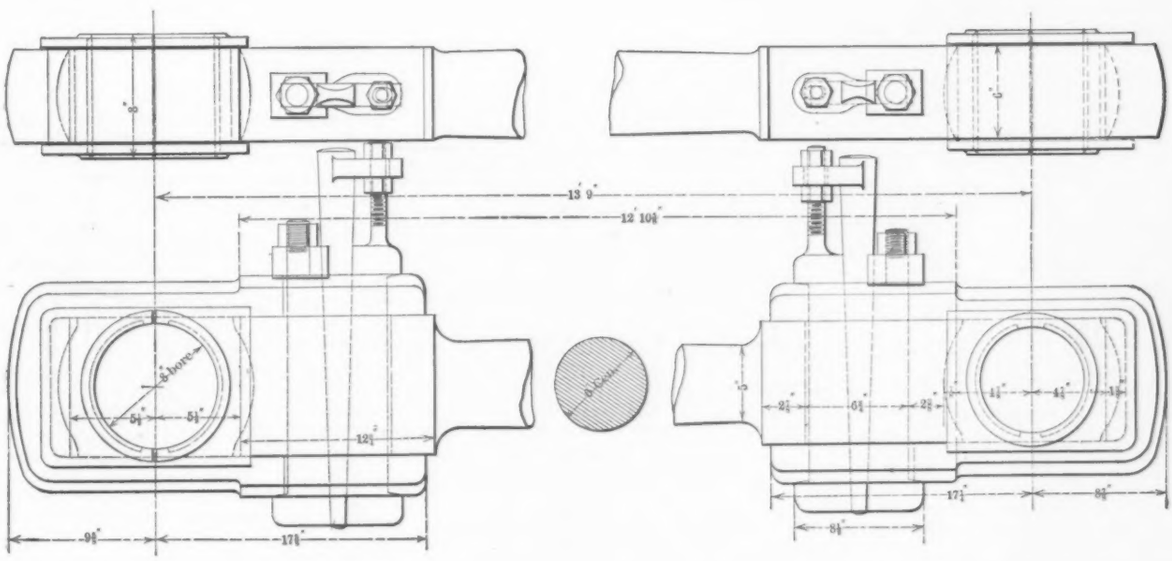


*Fig. 7.—Details of Connecting Rod Bearings.*

THE WRIGHT TRIPLE EXPANSION ENGINE.

crank pin and crank. The crankshaft bearing on each side of the driving pulley, with this arrangement, has the strain equally divided; the crank, crank pins, connecting rods and crankshaft bearings have only half the work on each of them, therefore they can be lighter, as the thrusts and friction are reduced one-half.

A triple engine arranged according to this plan takes up less room, is more compact and substantial, and all its parts are easy of access The engine room for this style of engine would be of better shape than the one required for the tandem triple expansion.

### Description of Triple-Expansion Engine.

The foregoing shows not only the foundation principle which should govern the construction of a triple-expansion steam engine, but it also clearly sets forth what we might assume to be the mechanical construction by means of which this could be carried out. To illustrate this, we propose now, by aid of the accompanying drawings, to describe the triple-expansion engine recently built by William Wright of Newburg, N. Y., for the American Mfg. Company of Brooklyn, N. Y.

The first feature attracting attention is the general arrangement of the engine, or, as we might otherwise express it, the placing or assembling of the several parts. It will be noticed in Fig. 2 that the piston rods of the three cylinders take hold of a common crosshead, Figs. 2 and 6, moving in suitable guides placed in a bracket, Fig. 5, extending from and serving to unite the three cylinders, as shown in Fig. 2. From each outer end of this crosshead extends a connecting rod, uniting with a wrist pin carried by a disk on each end of the crankshaft, the fly wheel, 18 feet in diameter and 82½ inches face, being mounted on the shaft between the pillow blocks.

The crosshead is made of steel and is fitted with top and bottom gibs near each end for working in the slides. There is also a central gib on the under side of the crosshead, working on a central slide. Spherical surfaces, where each piston rod passes through, are made with movable washers having spherical surfaces to fit,

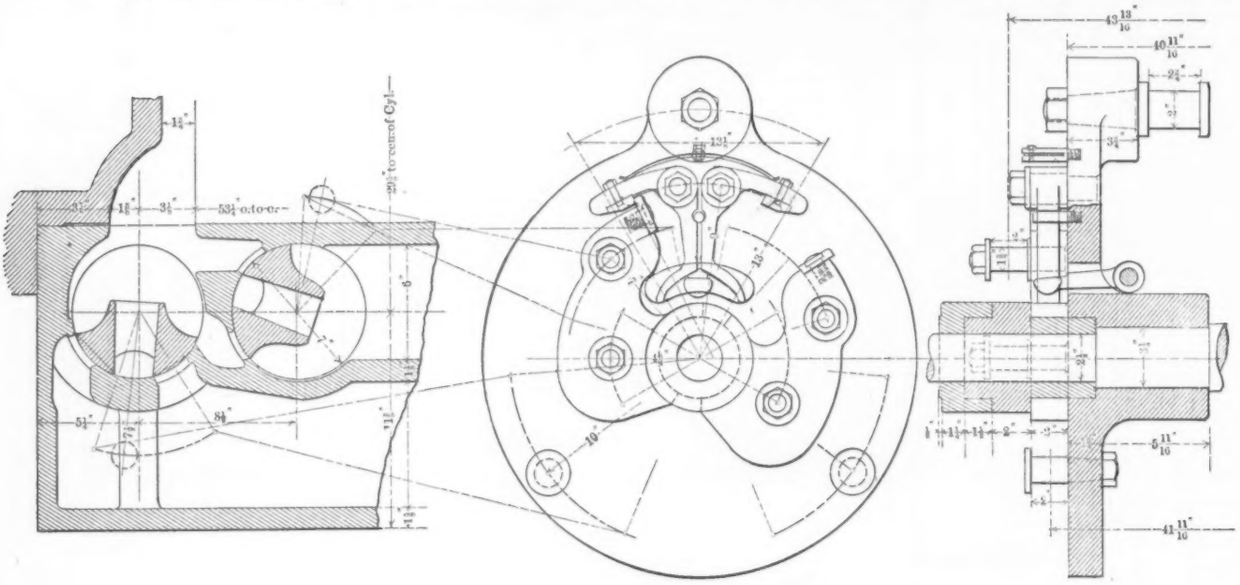


*Fig. 8.—Details of Valves and Valve Gear.*

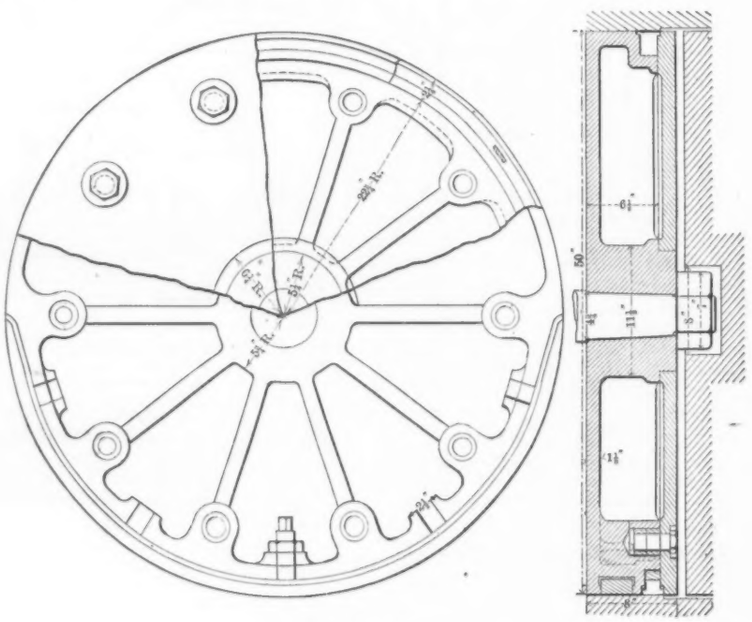


*Fig. 10.—The Piston.*

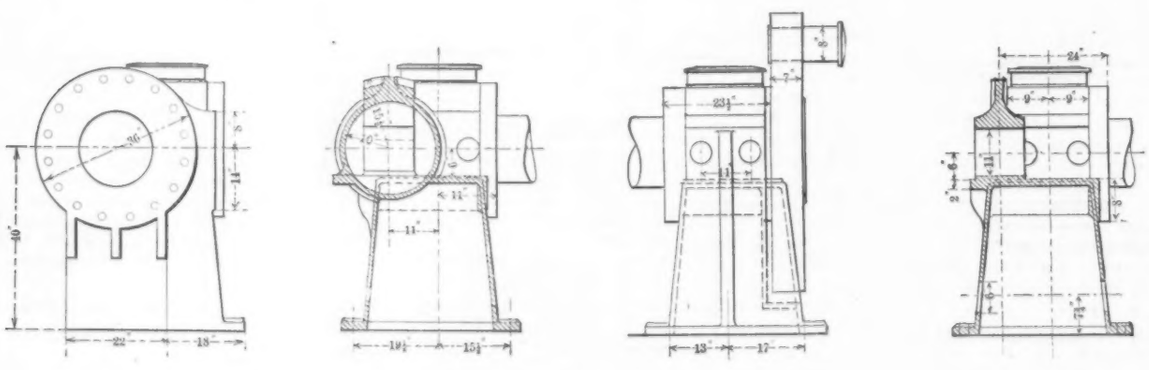


*Fig. 11.—Details of Bearings.*

THE WRIGHT TRIPLE EXPANSION ENGINE.

for the purpose of self-adjustment of the piston rods with the crosshead.

This method of transmitting one-half of the power developed to each crosshead journal, connecting rod, crank pin, and finally to the main shaft bearings, reduces the strain and decreases the friction by just one-half on the crank pins and journals. It will be further observed from the plan view that the engine is extremely compact, all its parts are of easy access, all strains are equally distributed, all its parts wear evenly and the liability of getting out of line is reduced to a minimum. These points are particularly desirable in an engine where great power is to be developed and where it is most essential that there should be no prominently weak part to be called upon to do the greatest amount of work.

The middle or high-pressure cylinder is connected through its piston rod to the center of the crosshead, and the intermediate and high-pressure piston rods are connected to each end, the rods being threaded to receive bolts, as shown. Outside of the intermediate and high-pressure connections are pins to receive the connecting rod. The connecting rod bearings are formed as shown in Fig. 7, this being a side elevation and plan. Adjustment is provided by means of a wedge and screw, but the principal feature will be found in the method of boring a spherical bearing, as indicated by the dotted lines. This is done in order that the slightest variation in alignment or the slightest difference in length of the two connecting rods, and which would, therefore, interfere with the right-angle alignment of the crosshead, can be compensated for. It is evident that a difference much more than ever would be possible in practical work is here provided for, and no matter what might be the variation attending the running of the engine, there would be no tendency to heat owing to a certain part of the bearing being brought under excessive pressure. Although this feature will never be brought into play in practical operation, it has been introduced in this engine merely and solely as a safe guard in order to provide for emergencies if there should be any difference in alignment.

### The Valves.

are shown in the left-hand drawing of Fig. 8, and detached and separate in Fig. 9. They extend completely across the cylinder and may be considered as belonging to the cylindrical type. The valve gear is shown to the right in Fig. 8. This gear is exceedingly simple, requires a minimun amount of power to run it, and is peculiarly sensitive to any variation in the governor.

The ordinary rotative-valve engine having only one opening in the cylinder valve seat, and no opening through the valve, admits steam over the edge of the valve into the cylinder port, requires a wide opening to admit and release the necessary amount of steam, the valves traveling over a space equal to the width of the port and lap of the valve, the time of closing being governed by the width of the opening and lap of the valve at the moment of release by the liberating valve gear. The distance traveled and time of closing of valves in one-ported seats in large engines of this class limit the number of revolutions that such engines can be run practically.

In the triple engines here shown the seats in the cylinder are constructed with two ports, as shown in Fig. 8, and the valves with one opening through them. The steam passing over the edge of the valve enters one of the ports, the opening through the valve admits the steam into the other port, thus reducing the friction and power to move the valves, and the engine can be run at higher speeds as the travel of the valves is reduced and the time of closing is proportionately shortened.

The stems in large valves pass through the length of the valve, and have a T-head fitted in each end of the valve, one end of the stem turned and passes through a stuffing box and gland for attaching the arm that operates the valve. The T-heads at each end give more surface and reduce the wear of the stem in the valve, the valves being free to move in the direction to keep the valve face and seat in contact with each other. This arrangement of ports reduces to a minimum the usual waste room in the cylinder and yields a construction exceedingly compact. It will be observed from Fig. 8 that the supply valve on the right and the exhaust valve on the left are arranged as close to each other as practicable without weakening the construction of the cylinder. The valves are cylindrical and are fitted in bored seats, arranged, as stated above, transversely of the cylinder. A cap or head closes one end of the valve seat, while the valve stem passes through a stuffing box closing the other end of the seat.

Extending across the cylinders is a rock shaft so connected as to be operated by the movement of the governor balls. This movement of the rock shaft, occasioned by the action of the governor, serves to raise or lower a tappet or cam projection which is struck at each oscillation of the wrist plate by one of two latches mounted on pins in the wrist plate, and which when they strike the tappet serve to disengage the valve, which is then seated by means of the dash pot. It will be observed, center cut Fig 8, that the lower ends of these latches are curved and that the time of opening of the valve will depend upon the hight to which the tappet is raised by the governor and consequently when it is struck by one or the other of the latches. The shortest cut-off is obtained when the tappet is at its highest point, the longest cut-off being when it is at its lowest point. The exhaust valves are of course driven without change from rigid pins mounted on the wrist plate. All the valves are operated from the same side of the wrist plate.

### The Piston.

An important feature of the piston is shown in Fig. 10, which gives a plan and section. Provision is here made for packing the piston by means of steam pressure, which is admitted behind and serves to throw out the packing rings. The left hand figure in Fig. 10 shows that the lower half of the piston is provided with a composition shoe which may be adjusted by means of the set screws shown. This is an important feature, since it permits of taking up all wear in both the cylinder and piston which might result from the dead weight of the piston itself traveling back and forth. It is embodied in all the cylinders, and we may add that all engines built by Mr. Wright have this feature.

### General Data.

The engine is of 1000 horse-power with steam at 150 pounds initial pressure. The cylinder diameters are: High pressure, 20 inches; intermediate, 32 inches; low pressure, 50 inches; the stroke being 48 inches. The fly wheel is 18 feet in diameter by 82½-inch face and carries two belts 56 and 26 inches wide. The main shaft is 13 inches in diameter in the bearings and 15 inches outside, and the bearings are 23½ inches long. Drawings of the details of the bearings are shown in Fig. 11. An eccentric is placed upon each end of the shaft, inside of the bearings, one eccentric actuating the valve gear of the high and low pressure cylinders, while the other actuates the valve gear of the intermediate.

Although this engine has only been in place a few weeks it has run smoothly and without developing any weak part whatever. To say that it has fully met the expectations of its designer and builder is, perhaps, the strongest praise we can bestow upon it.

## Cost of Tin-Plate Plant.

Under date of June 13, R. J. Hutchings of the Hubbard Iron Company, Hubbard, Ohio, addressed the following letter to C. R. Britton of Britton Rolling Mill Company, Cleveland, Ohio, on the estimated cost of putting up a four-mill tin-plate plant:

Your esteemed favor to hand with estimated cost of a four-mill tin-plate plant to produce 2500 boxes per week, $117,840, which is certainly too high; $100,000 should cover all cost to erect such a mill complete with three pair of cold rolls and eight tinning stacks. Four tinning stacks might do by working day and night, which is not advantageous for several reasons. Metal pots require rest to rid themselves of scruff which raises to the surface, and is skimmed off the first thing in the morning. If these pots are worked day and night, the plates get scruffy and look dull. In England it is customary for tin-plate mills to start with two sheet mills having the engine strong enough to drive four mills, the other two sheet mills being added in course of time. Such a mill with all requirements and buildings complete costs £8000, say $40,000, so I consider a tin-plate mill with four sheet mills would cost $75,000 in England. From these figures I base my calculations by saying $100,000 should complete a similar mill in America. However, I expect in a few days to get at the actual cost of four sheet mill plant, and will forward same to you. I shall be too busy to attend your meeting next week. I find from *The Iron Age* it will be chiefly to decide as to branding boxes with gauges instead of IC, IX, &c., or pack boxes with 100 sheets instead of 112 sheets. Will not these alterations make it complicated for the consumer while imported plates are in the market of same quality, but differently marked and of greater number of sheets? In fact, it is not practicable to draw every sheet (say 30 gauge) same thickness; some will be 29 and nearly 28 gauge, some may be 31 gauge, and if a consumer bought 100 tons, to be delivered, as required, within six months from date of order, and market went down in price before this order was delivered, he might handle the difference in the gauges not being according to order as excuse to cancel the order or claim an abatement in the price; but IC does not make it binding to 30 gauge, nor IX to 28 gauge, but as near as practicable. Further, if 100 sheets is to be the number in each box instead of 112 sheets, this will call for more boxes to every ton of plates, more nails, more labor, &c. IC, IX, IXX, &c., mean thickness as near as possible to their respective gauges, and the cost per box is worked out from these brands, same as if mark 30 or 28 or 25 gauge, but are not so binding, being more in favor of the manufacturer. Now, I had better give up, or you will say I am fighting this question. However, it is not so; I should like to find the meeting had arrived at some basis or rule that would meet with the approval of all concerned.

Brazil's financial prospects are thought to be improving. On April 15 the treasury contained $20,000,000, nearly all gold, a gain of $6,000,000 since January, and at the Legation in London there was $15,000,000 more, sufficient to meet interest charges. The new cabinet appear to have inaugurated severe measures of retrenchment. Nevertheless, the monetary condition at Rio is reported to be critical.

## On the Exact Subdivision of an Index Wheel into any Required Number of Equal Parts.*

BY W. A. ROGERS, WATERVILLE, MAINE.

The writer had occasion, a few months ago, to subdivide into 1000 equal parts the index-wheel of the screw-cutting engine,

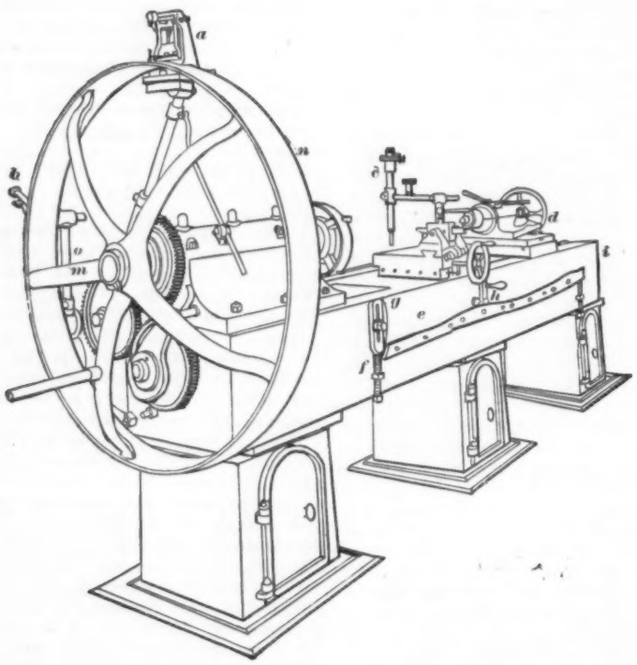


*Fig. 1.—Exact Subdivision of an Index Wheel.*

Fig. 1, of the paper on a perfect screw-cutting machine. The diameter of the wheel is 4 feet.

At first an attempt was made to produce an exact reproduction of a graduated of a systematic character. While the relative errors of adjacent subdivisions were very small, the cumulative errors were very large. At one point in the revolution the lines were even thrown out of the field of the microscope. This method of transfer was therefore abandoned.

The method which will now be described was found to be easy of application and entirely adequate. First, a narrow strip of firm paper was wrapped around the disk and its length was made equal to the circumference. By three foldings it was then divided into four equal parts. Each of the four parts was then further subdivided into 25 equal parts by the aid of an auxiliary paper scale.

The paper band was then fastened firmly to the periphery of the wheel and the divisions were transferred to the disk by means of a small try square and a sharp cutting tool.

It was found by examination that while the errors of the individual graduations were in some cases quite large, the cumulative errors did not much exceed the accidental errors of subdivision.

The next step consisted in the investigation of the errors of the one hundred subdivisions thus produced. Two microscopes, fitted with filar micrometers, were set at a distance apart approximately equal to one-tenth part of a revolution. The fixed line of the micrometer of the lower microscope was set in succession upon each subdivision into ten equal parts, and the reading of the micrometer of the upper microscope was taken for coincidence with the lines under this miscroscope. The miscroscopes were then set at a distance apart equal to one-hundredth of a revolution, and similar measures were made for each group of ten subdivisions. The method of reducing the observations will appear from the following example. The first column contains the readings of the upper micrometer, after coincidence had been made with the tenth line preceding under the lower microscope. The second column contains the corrections required to reduce the readings for each line to the mean of the ten readings. These relative corrections are referred to the initial line of the series by successive additions, as shown in the third column.

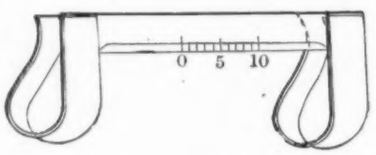



*Fig. 2.—Method of Subdividing.*

The summed series is indicated by Σ, the usual sign for summation. For example, the space between lines 0 and line 60 is 48.1 divisions of the micrometer, greater than six-tenths of the entire circumference.

TABLE I.

| Lines. | Microm. reading. | Corr. | Σ. |
|---|---|---|---|
| 1 | 15.4 div. | + 16.2 | + 16.2 |
| 2 | 10.4 | + 21.3 | + 37.5 |
| 3 | 45.1 | − 13.5 | + 24.0 |
| 4 | 12.0 | + 19.7 | + 43.7 |
| 5 | 59.0 | − 27.4 | + 16.3 |
| 6 | 96.0 | − 64.4 | − 48.1 |
| 7 | 12.0 | + 19.7 | − 28.4 |
| 8 | 0.4 | + 31.2 | + 2.8 |
| 9 | 0.1 | + 31.61 | − 34.4 |
| 10 | 66.0 | − 34.3 | 0.0 |
| | 31.64 | | |

TABLE II.

| Group 0 to 10. | | | Group 10 to 20. | | | Group 20 to 30. | | | Group 40 to 50. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Microm. reading. | Corr. | Σ. | Microm. reading. | Corr. | Σ. | Microm. reading. | Corr. | Σ. | Microm. reading. | Corr. | Σ. |
| 10.6 div. | + 5.9 | + 5.9 | 10.0 div. | − 0.8 | − 0 8 | 6.2 div. | − 3.6 | − 3.6 | 7.6 div. | − 1.0 | − 1.0 |
| 20.1 | − 3.6 | + 2.3 | 18.0 | + 7.2 | + 6.4 | 8.0 | − 1.8 | − 5.4 | 8.0 | − 0.6 | − 1.6 |
| 38.0 | − 21.5 | − 19.2 | 14.2 | + 3.4 | + 9.8 | 0.0 | − 9.8 | − 15.2 | 1.0 | − 7.6 | − 9.2 |
| 4.2 | + 13.3 | − 6.9 | 17.3 | + 6.5 | + 16.3 | 20.1 | + 10.3 | − 4.9 | 12.4 | + 3.8 | − 5.4 |
| 8.1 | + 8.4 | + 1.5 | 2.4 | − 8.4 | + 7.9 | 12.0 | + 2.2 | − 2.7 | 17.1 | + 8.5 | + 3.1 |
| 25.1 | − 8.6 | − 7.1 | 16.8 | + 6.0 | + 13.9 | 14.0 | + 4.2 | + 2.5 | 19.0 | + 10.4 | + 13.5 |
| 0.4 | + 10.1 | + 9.0 | 9.2 | − 1.6 | + 12.3 | 17.0 | + 7.2 | + 8.7 | 1.0 | − 7.6 | + 5.9 |
| 40.1 | − 23.6 | − 14.6 | 4.8 | − 6.0 | + 6.3 | 2.2 | − 7.6 | + 1.1 | 3.8 | − 4.8 | + 1.1 |
| 10.2 | + 6.3 | − 8.3 | 6.7 | − 4.1 | + 2.2 | 10.4 | + 0.6 | + 1.7 | 5.8 | − 2.8 | − 1.7 |
| 8.3 | + 8.2 | 0.0 | 8.6 | − 2.2 | + 0.0 | 8.1 | − 1.7 | + 0.0 | 10.3 | + 1.7 | 0.0 |
| 16.51 | | | 10.8 | | | 9.8 | | | 8.6 | | |

TABLE III.

| Lines. | I. | II. | Sum. | Lines. | I. | II. | Sum. | Lines. | I. | II. | Sum. | Lines. | I. | II. | Sum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.0 | 0.0 | 0.0 div. | 10 | + [16.2] | 0.0 | + [16.2] | 20 | + [37.5] | + 0.0 | + [37.5] | 30 | + [24.0] | 0.0 | + [24.0] |
| 1 | + 1.6 | + 5 9 | + 7.5 | 11 | + 18.3 | − 0.8 | + 17.5 | 21 | + 36 2 | − 3 6 | + 32.6 | 31 | + 26.0 | − 1.0 | + 25.0 |
| 2 | + 3.2 | + 2.3 | + 5.5 | 12 | + 20.5 | + 6.4 | + 26.9 | 22 | + 34 0 | − 5.4 | + 28.6 | 32 | + 28.0 | − 1.6 | + 26.4 |
| 3 | + 4.8 | − 19.2 | + 14.0 | 13 | + 22.5 | + 9.8 | + 32.3 | 23 | + 33.5 | − 15.2 | + 18.3 | 33 | + 29.9 | − 9.2 | + 20.7 |
| 4 | + 6.4 | − 6.9 | − 0.5 | 14 | + 24 8 | + 16.3 | + 41.1 | 24 | + 32.1 | − 4.9 | + 27.2 | 34 | + 31 9 | − 0.4 | + 31.5 |
| 5 | + 8.1 | + 1.5 | + 9.6 | 15 | + 26.6 | + 7.9 | + 34.5 | 25 | + 30.8 | − 2.7 | + 28.1 | 35 | + 33.9 | + 3.1 | + 37.0 |
| 6 | + 9.7 | − 7.1 | + 2.6 | 16 | + 28.8 | + 13.9 | + 42.7 | 26 | + 29.4 | + 2.5 | + 31.9 | 36 | + 35.8 | + 13.5 | + 49.3 |
| 7 | + 11.3 | + 9.0 | + 20.3 | 17 | + 31.0 | + 12.3 | + 43.3 | 27 | + 28.0 | + 8.7 | + 36.7 | 37 | + 37.8 | + 5.9 | + 43.7 |
| 8 | + 12.9 | − 14.6 | − 1.7 | 18 | + 33.1 | + 6.3 | + 39.4 | 28 | + 26.7 | + 1.1 | + 27.8 | 38 | + 39.8 | + 1.1 | + 40.9 |
| 9 | + 14.5 | − 8.3 | + 6 2 | 19 | + 35.3 | + 2.2 | + 37.5 | 29 | + 28.4 | + 1.7 | + 30.1 | 39 | + 41.7 | − 1.7 | + 40.0 |
| 10 | + [16.2] | 0.0 | + 16.2 | 20 | + [37.5] | 0.0 | + [37.5] | 30 | + [24.0] | + 0.0 | + [24.0] | 40 | + [43.7] | 0.0 | + [43.7] |

In the present case the value of one division of the micrometer was found to be $\frac{1}{1000000}$ inch, but the reduction to absolute units of length is not required.

The second table contains a similar investigation of the corrections for each line of the groups 0..10, 10..20, 20..30, &c

* Presented at the Providence meeting (1891) of the American Society of Mechanical Engineers.

In order to economize in space, only the data of the first four groups are given.

The results given in Tables I and II are combined in Table III. The first column contains the corrections for each tenth of a revolution, distributed proportionately over each hundredth part of a revolution. This process is not strictly correct. In order to reduce the magnitude of the error thus introduced, it will generally be found necessary to make two and sometimes three repetitions of the investigation with new sets of graduations obtained by applying the corrections already obtained to the micrometer reading of each of the lines of the first set of graduations. It is my custom to trace the graduations on opposite edges of the periphery, so that when a second set is made the first may be polished out.

If the accidental errors of the provisional graduations are large, this method of reduction will introduce rather large systematic errors, which will nearly or quite disappear in the second approximation. In the present case three approximations reduced the errors of the subdivision to a minimum value of about 0.0003 inch. It may be added that the time required for each series of measures was about two hours.

The subdivision of each of the 100 subdivisions into 10 equal parts was accomplished by means of an arrangement shown in Fig. 2.

A strip of band-saw steel was prepared with a beveled edge, upon which were traced two lines whose distance apart was by successive trials made exactly equal to each of the subdivisions ruled upon the index wheel. This space was then subdivided into ten exactly equal parts, thus obviating the necessity of applying any corrections.

The process of ruling the lines consisted in bringing each of the 100 lines into coincidence with the micrometer of the fixed microscope, and each line of the auxiliary scale in coincidence with the micrometer of a second microscope, the scale being moved forward into coincidence with a new subdivision as fast as each one-hundredth division was ruled. The time required to make the entire subdivision into 1000 equal parts was three hours and 40 minutes.

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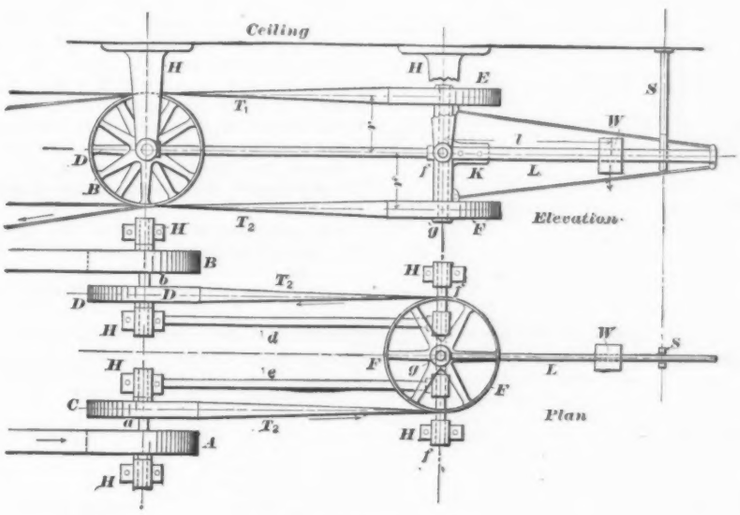
The contract for making the steel forgings for the Haskell multicharge gun has been awarded to the Bethlehem Iron Company, and the contract for finishing the gun to the Reading Iron Company. The amount appropriated for the manufacture of this gun is $55,000.

## A Belt Dynamometer.*

BY S. P. WATT, CINCINNATI, OHIO.

The dynamometer here presented consists of a set of pulleys mounted on a suitable frame and disposed as follows: The pulleys A and C are fixed to the shaft *a*; B and D are fixed to the shaft *b*. The pulleys E and F revolve freely, as independent loose pulleys on the shaft *g*. The shaft *g* has a second shaft, *f*, fixed to it midway between the pulleys E and F. Shaft *f* constitutes a pivoting axis, parallel to the shafts *a* and *b*, for the shaft *g*, together with the frame K and the weight lever L, all rigidly connected. Only enough motion of L is allowed to determine the direction of action. Instead of the weight on the lever L, the end of the lever could be connected to a small platform scale and its tendency to rotate weighed. It might be useful to make the frame between the pulleys adjustable at *d* and *e* in order to vary the tension of the dynamometer belt, or better still, it might be so constructed that the absolute tension could be noted at any time, whether working or at rest. The working of the apparatus is as follows: A driving belt from




BELT DYNAMOMETER.

the source of power is put on the pulley A. The machine to be driven is belted from the pulley B. The dynamometer belt passes from the lower side of the pulley C to the pulley F, around F to D, around D to E, around E back to C. It will be seen that C is a driving pulley and D a driven pulley. When the system is at rest the four strands of the dynamometer belt have the same tension. If now C revolve and drive D, the tension $T_1$ of the belt from C around the loose pulley F to D, will correspond to the tension of the taut side in a simple system of two pulleys, and the tension $T_2$ of the belt from the lower side of D around F back to the lower side of C will correspond to the slack side.

The difference of tension is the driving pressure $P$, and taking what actually occurs we have

$$\frac{2T_1 - 2T_2}{2} = T_1 - T_2 = P.$$

Now $P$ in pounds multiplied by the speed of the belt is foot pounds developed or consumed, ignoring friction. Let $r$ be the radius of the position of pulleys E and F from the pivot. Let $l$ be the distance of the weig W from $f$, to balance the tendency of the frame K to rotate about $f$ when working, then

$$Wl = r(2T_1 - 2T_2) \text{ or } \frac{Wl}{2r} = T_1 - T_2 = P.$$

It is evident that should a Prony brake be put in place of the pulley B the power developed by the motor to A could be determined. If a machine be driven from the pulley B, the power consumed could also be noted in the speed of belt and the position of the weight from the same formula. In the use of different belts as dynamometer belts, the relative efficiency of such belts can readily be determined by the use of the brake attachment. It will also be seen that but one side of the belt comes in contact with the pulleys.

* Presented at the Providence meeting (1891) of the American Society of Mechanical Engineers.

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## The Chicago Wire Goods Company's Failure.

The property of the Chicago Wire Goods Company, at 23 Lake street, Chicago, and Aurora, Ill., was placed under execution on the 17th inst. by creditors. The first writ issued was in favor of Louis Wohl for $25,000. Afterward A. H. and E. C. Morton entered judgments on three notes aggregating $10,000. The Mortons are president and secretary of the company, and own a large block of stock. Their claims are for money loaned the company. D. V. Webster also began suit in the Circuit Court for $15,000. The financial condition of the concern cannot be stated with any certainty. The company owned a valuable factory at Aurora, Ill., stocked with machinery for the manufacture of wire goods and novelties. Its estimated value is about $75,000. The offices and storehouse at 23 Lake street will also figure among the assets, and to this must be added outstanding accounts worth several thousand dollars. The Chicago Wire Goods Company had a capital stock of $100,000 and are two years old. They were organized out of the New Haven Wire Goods Company, and followed the same general line of business. The new company continued the old New York office and have done a large business through the Middle States. One of the causes assigned for the present difficulties is that the officers could not obtain sufficient capital to maintain an expensive plant. The Mortons—Albert H., president, and Eugene C., secretary and treasurer—became interested in the company about the time of the reorganization. They are thought to have considerable money, and are interested in several real estate and building deals. Until recently they had an office in Temple Court Building.

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**For South American Trade.**—A special dispatch to the Chicago *Tribune* from Mobile, under date of June 17, says: "The promoters of the Pan-American Transportation Company held their second day's session to-day and the company were organized. The charter recently obtained authorizes a capital of $5,000,000. One million dollars paid up capital stock was represented in the organization. The following officers were elected: J. B. Clarke of Chicago, president; F. C. Rutan of Chicago, vice-president; William Kulp of Iowa, treasurer; F. L. Dana of Galveston, Texas, secretary. The object of the company is to establish a number of steamship lines between Mobile and Central and South American ports. As soon as possible the working machinery of the company will be put in order, and the steamships will be put on at an early date."

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A second enlarged and revised edition of the Handbook of the American Republics has been published by the Bureau of American Republics, of which William E. Curtis is the executive officer.

## Manganese Steel.*

BY H. M. HOWE, BOSTON, MASS.

Manganese steel is an alloy of iron and manganese, incidentally, and probably unavoidably, containing a considerable proportion of carbon.

The effect of small proportions of manganese on the hardness, strength and ductility of iron is probably slight. The point at which manganese begins to have a predominant effect is not known; it may be somewhere about 2.5 per cent. As the proportion of manganese rises above 2.5 per cent. the strength and ductility diminish, while the hardness increases. This effect reaches a maximum with somewhere about 6 per cent. of manganese. When the proportion of this element rises beyond 6 per cent. the strength and ductility both increase, while the hardness dimishes slightly, the maximum of both strength and ductility being reached with about 14 per cent. of manganese. With this proportion the metal is still so hard that it is very difficult to cut it with steel tools. As the proportion of manganese rises above 15 per cent. the ductility falls off abruptly, the strength remaining nearly constant till the manganese passes 18 per cent., when it in turn diminishes suddenly.

Steel containing from 4 to 6.5 per cent. of manganese, even if it have but 0.37 per cent. of carbon, is reported to be so extremely brittle that it can be powdered under a hand hammer when cold, yet it is ductile when hot.

We have here another of the endless cases in which the properties of the alloy differ greatly from the mean of those of its components. This usually astonishes the novice, and even experienced metallurgists are often betrayed by it into expressions of surprise. It is, in fact, about as surprising as the parallel fact that the properties of water are not the mean of those of oxygen and hydrogen, and that those of peroxide of hydrogen are not directly deducible from those of water and oxygen.

Passing by such striking properties of manganese steel as its freedom from blow holes, the great difficulty with which it welds, the increase in its toughness caused by quenching from a yellow heat, its electric resistance enormous and very constant with changing temperature, its low thermal conductivity—passing these by, one group of qualities stands out as that which must create and yet limit its value in the arts. I refer to its remarkable combination of great hardness, which cannot be materially lessened by annealing, and great tensile strength, with astonishing toughness and ductility. This group, I say, must at once create and limit its usefulness. The very fact that manganese steel cannot be softened; that it ever remains so hard that it can be machined only with great difficulty, at once sets up a great barrier to its usefulness, yet a barrier which, as we shall soon see, is not so insurmountable as it might at first appear.

On the other hand, if, as I believe, this cheap metal has a much higher combination of the important properties of hardness and ductility than exists in any other known substance, metallic or non-metallic, we can hardly hesitate to prophesy for it an important and useful future, for we can hardly doubt that for some important purposes this combination is extremely desirable. This combination is illustrated by these strips which have been bent double cold, and yet can barely be filed.

* Presented at the Providence meeting (1891) of the American Society of Mechanical Engineers.

### RESISTANCE TO ABRASION.

The results given in Table I were obtained by T. T. Morrell, chief chemist of the Cambria Iron Works, by pressing weighed pieces of manganese steel and of other steel, with a constant pressure, against a rapidly revolving hardened steel shaft, and ascertaining the loss of weight which each piece underwent per 1000 revolutions of this shaft. Here manganese steel, indeed, wears faster than tempered tool steel, but this is not a material which enters into competition with manganese steel, as it is not ductile. The difference between the wear of manganese steel and that of the other steels tested is very great.

*Table I.—Abrasion by a Revolving Hardened Steel Shaft.*

| | |
|---|---|
| Loss of weight of manganese steel | 1.0 |
| Loss of weight of blue-tempered hard tool steel | 0.4 |
| Loss of weight of annealed hard tool steel | 7.5 |
| Loss of weight of hardened Otis boiler-plate steel | 7.0 |
| Loss of weight of annealed Otis boiler-plate steel | 14.0 |

The advantage of manganese steel is much less striking, as explained beyond, when it is exposed to abrasion by an intensely hard substance, like emery. This is shown in Table II:

*Table II.—Abrasion by an Emery Wheel.*

| | |
|---|---|
| Loss of weight of hard manganese-steel wheels | 1.00 |
| Loss of weight of softer manganese-steel wheels | 1.19 |
| Loss of weight of hardest carbon-steel wheels | 1.23 |
| Loss of weight of soft carbon-steel wheels | 2.85 |

### HARDNESS AND RIGIDITY.

The hardness of manganese steel seems at first to be of a peculiar nature. We class together under the single term "hardness" what seem to be several tolerably distinct properties. These, though they habitually coexist, do not necessarily. Resistance to abrasion, to indentation by a sharp object, and to compression, habitually go hand in hand; yet, on reflection, we see that there is no *a priori* reason why they must coexist. I think that the tensile elastic limit should be closely related to the cohesion of the substance along the lines of least cohesion, or to the minimum cohesion. The resistance to abrasion, should the lines of low resistance be far apart, may bear little relation to this minimum cohesion, but be dependent on the cohesion between the particles immediately exposed to abrasion and those next them. The tensile elastic limit and the ultimate tensile strength of an emery wheel are very low; its resistance to abrasion enormous. That is because its minimum cohesion, which occurs between the grains of emery and their cementing matter, is very low; while the cohesion between the molecules of any one individual grain of emery is enormous. Among absolutely homeogeneous substances, free from initial stress, the resistance to compression, to abrasion and to tensile distortion should be proportional. It is, I take it, because many substances are heterogeneous, with lines of low resistance, like the joints in brickwork, the cleavage in crystals, the grain in wood, that these properties often bear so little relation to each other.

Again, while the resistance to compression in a material which yields by bulging should be related to the tensile elastic limit, since such substances simply take set under compression, the particles changing their relative positions without solution of continuity, the resistance to abrasion should be related to the ultimate tensile strength, since each is measured by the force needed to break continuity by tearing particle from particle. This force at the plane where any two particles are torn apart is in either case a pull—*i. e.*, tensile.

The resistance to abrasion, moreover, should be related to the coefficient of friction of the metal; or, regarding the surface of the metal as like a brush or the surface of a file, the abrasion and the coefficient of friction should depend on the depth to which the teeth of the abrading file fit between those which it is to abrade and the mode of distribution of the teeth of the two files which are abrading each other.

Be this as it may, the hardness of manganese steel seems to be of an anomalous kind. The alloy is hard, but under some conditions not rigid. It is very hard in its resistance to abrasion; it is not always hard in its resistance to impact. I do not recall a case in which it has not shown itself very hard when exposed merely to abrasion, yet there are cases in which it has not shown itself hard under repeated impact.

I do not refer to the mere fact that it can be indented by a sharp blow; this power of enduring distortion is almost a necessary consequence of its great ductility. I refer to its behavior under conditions like those of a hammer head or stamp shoe. As a material for stamp shoes, for horse shoes, for the knuckles of an automatic car coupler, manganese steel has not met our expectations. When we remember how many of us have been studying carbon steel these long years, and how ignorant we must yet confess ourselves concerning even some of its prominent characteristics, there is little wonder if, in speaking of so little studied a material as manganese steel, I must admit that its rigidity in certain cases, its pliancy in others, is puzzling.

TABLE III.

*Tests of Manganese and of Carbon-Steel Axles.*—Hadfield.*

| Effect produced by the number of blows as under. | Energy developed in foot-tons. | Sum of permanent deflections or bends in inches produced on— | |
|---|---|---|---|
| | | No. 1 Special steel axle. | No. 2. Manganese-steel axle. |
| At the fifth | 79.883 | 24.953 | 8.701 |
| At the tenth | 208.531 | 66.188 | 19.463 |
| At the fifteenth | 348.591 | 105.248 | 30.312 |
| | | And broken. | |
| At the twentieth | 497.988 | | 39.491 |
| | | | And broken. |

*Excerpt Proc. Inst. Civ. Engineers, XCIII., Part III., 1888, p. 29.

### ARMOR PLATES.

The armor plates which I will soon describe give an instance of apparently great rigidity under shock; but it is probable that the reason why the manganese-steel armor plates did not crack, while the steel one did, is that the manganese steel can undergo such great distortion without failure of continuity. For, though the plates as a whole are but little distorted, the metal immediately

about the holes must have been distorted greatly, yet but trifling cracks appear.

CAR AXLES.

Another instance of rigidity under shock is that of a manganese-steel car axle tested by Hadfield, in comparison with a special carbon-steel axle. Each was struck repeatedly by a 20.75-hundredweight ram, while resting on supports 3 feet apart, and each was reversed after every blow, in the usual way. The manganese-steel axle received, up to the time of breaking, blows representing 43 per cent. more energy than those received by the carbon-steel axle; yet the total deflection of the manganese-steel axle was very much less than that of its competitor. (See Table III.)

CAR WHEELS.

A case of good behavior under shock is furnished by a 33-inch manganese-steel car wheel, weighing about 612 pounds. It was dropped edgewise on a 1-ton steel block, bedded in the ground, repeatedly, from gradually increasing hights, rigid as the carbon steels with which it will then have to compete, direct experiment alone can tell.

Having called your attention to the great obstacle to the use of manganese steel, its persistent hardness, let me now point out how this obstacle may be evaded and even surmounted.

SPECIAL FORGING APPLIANCES.

Fortunately, manganese steel forges readily at a yellow heat, though at a bright white heat it crumbles under the hammer. But it offers greater resistance to deformation—*i. e.*, it is harder when hot—than carbon steel. This increases the cost of forging to a certain extent, and if very great reduction of cross section is to be effected by forging the increased cost may be very serious; hence it is desirable that the ingot or other casting which is to be forged should have, when cast, as nearly as possible the dimensions of the finished piece, so that but little forging may be needed.

TABLE IV.

*Drop Tests on Manganese-Steel and other Car Wheels.*

| Manganese-steel wheel. | | Soft carbon-steel wheel. | | Chilled cast-iron wheel. | |
|---|---|---|---|---|---|
| No. of drops. | Hight of fall. Feet. | No. of drops. | Hight of fall. Feet. | No. of drops. | Hight of fall. Feet. |
| 2 | 16 | 1 | 10 | 1 | 4 |
| 9 | 28 | 1 | 11 | 1 | 6 |
| | Rim slightly cracked. | 1 | 12 | 1 | 10 |
| | | 1 | 13 | | Broke into six pieces. |
| 3 | 28 | 1 | 14 | | |
| | Tread broken through. | | Cracked slightly. | | |
| | | 7 | 15 | | |
| | | 1 | 18 | | |
| | | | Cracked about 1-6 across the face of the tread. | | |
| Total hight dropped... | 368 | ..... .... | 183 | ... ..... | 20 |
| Average hight of drop. | 26.3 | ..... | 14.1 | .... .... | 6.7 |

with the results given in Table IV. For comparison, an American chilled cast-iron wheel, made by one of our best makers, and also some excellent carbon-steel wheels, were tested in the same way.

The total energy represented by the work done on the manganese-steel wheel was 100 foot-tons, or 18 times as much as in case of the cast iron and twice as much as in case of the carbon steel; and this, although the average fall of the manganese-steel wheels was four times that of the chilled cast iron and nearly double that of the carbon steel. (See Table IV.)

AXES.

Again, manganese-steel axes have chopped cold iron bars through. Here we have great rigidity under shock.

Yet in other cases manganese steel has not shown the rigidity which those I have just described would lead us to expect. However, I know of none in which manganese steel has proved brittle under shock, except in early experimental work, in which the steel was unwisely given too much carbon, and further excepting untoughened manganese-steel castings.

A partial explanation of the cases I have referred to, and of others, and an inference from them, is that manganese steel is more rigid than the soft steels with which it competes in ductility, but less rigid than the hard steels, which it excels in hardness.

To sum this up, in resistance to abrasion alone manganese steel excels the hard carbon steel (when unhardened), and *a fortiori* of the soft steels. Where both abrasion and repeated shocks are to be resisted, manganese steel is certainly less liable to break than the hard carbon steels; but whether, under new conditions, combining shock and abrasion, it will prove as

Iron, carbon steel, and the other metals and alloys in general use, are readily tooled when cold. Hence we have in general tolerated forging appliances which leave the piece in a shape in which a considerable amount of tooling is needed. But, even for these metals, recent years have developed ingenious methods of forging even complicated pieces so closely to the needed shape as to avoid subsequent tooling or to greatly reduce it. We have not only the great advances in drop forging, but several different kinds of rolling machines, of the general class to which the Simonds rolling machine belongs.

BRIDGE PINS.

For example, it appeared that manganese steel should be a valuable material for bridge pins, since these need not only great shearing strength, but great hardness. If they wear away, the play which arises is extremely injurious to the bridge. We were at once confronted with the difficulty of providing threads on the ends of the pins to hold the lock nuts. The difficulty had hardly arisen when it was overcome by the discovery that Messrs. Wyman & Gordon of Worcester, had a machine which forges threads on round bars of any size, and apparently accurately enough for this pupose.

COLD SHAPING.

Turning now from this way of evading the hardness of manganese steel by special appliances for working it while hot, we come to appliances for shaping it while cold, despite its hardness. These are, first, emery wheels of various kinds for cutting it; second, hardened carbon-steel rollers, dies, &c., which work it cold.

Emery is so much harder than manganese steel that it cuts it with great ease. Indeed, as an observer from the summit of a lofty mountain hardly notes the little hills at its base, their elevation being so trifling compared with his, so the hardness of emery exceeds that of manganese steel so greatly, that when cut by the emery, the resistance of this metal to abrasion excels that of carbon steel much less than when the abrasion is effected by a revolving steel shaft. This is illustrated by Table 2.

I may almost say that what the common hardened steel tool is to most metals the emery wheel will be to manganese steel. Just as we turn other metals in the lathe by holding a hardened steel tool against them while they revolve, so we may turn objects of manganese steel by mounting them in like manner, and simply substituting for the hardened steel tool an emery wheel revolving swiftly. So, too, may the stationary tool of the planer, and in some cases the reciprocating tool of the slotting machine, be replaced by the revolving emery wheel, the piece which is to be planed moving past the emery wheel, that which is to be slotted remaining stationary, while the emery wheel, driven by belt or gearing, plays up and down.

HARDENED STEEL.

Turning now to means of working rather than of abrading it when cold, this thin wire shows at once that it is possible to work the metal cold to a very considerable extent. This wire has been made by drawing through dies when cold in the common way. It is, however, hardly likely that manganese steel wire will be widely used, the material offers so much resistance in drawing, is so hard, and requires such frequent annealing. After every two drafts it must be highly heated and quenched in cold water.

The great amount of cold working which wire drawing requires may be so costly as to be prohibitory, yet a smaller amount may cost but little. If manganese steel could not be worked cold at all, it might be a serious thing. Even the most accurate methods of hot forging bring the metal only approximately to the size desired, for the following reason: The temperature at which the metal is forged while hot must vary considerably. As that temperature varies, so does the number of degrees through which the metal must pass in cooling thence to the common temperature; and as the contraction of the metal in cooling is proportional to range of temperature through which it cools, so must the amount of contraction which the metal undergoes in cooling vary. So that no matter how accurately we bring the metal to a given desired shape and size when hot, as we cannot regulate closely the temperature at which we give it that size and shape, so will the size and shape which the metal has after cooling vary. For many purposes this variation may not be serious. But for many others it is extremely serious, not to say prohibitory. Yet so slight is it that but a very little cold working is needed to compensate for it.

Now, it so happens that Samuel Johnston of 140 Nassau street, New York City, has devised and constructed machines capable of rolling manganese steel and other metallic substances while cold, and with great ease. I have here a strip of manganese steel which was originally throughout its length of the cross section which its larger end now has. It has been worked down to its present shape while cold, and without annealing. I am informed that this machine can produce pieces of exceedingly irregular shape. With the slight familiarity which I have with it, I find it difficult to set a limit to the shapes which it can produce. As we can turn wooden gun stocks and axe handles in a lathe, so can this machine turn out even most irregular pieces.

It is still too early to assign to those two methods of shaping mangagese steel when cold their exact fields. In many cases it is probable that either can be used, as in turning bridge pins and car wheels, in trimming armor plates, and in shaping plow points. In other cases, such as that of car axles, where an irregular cross section must be given with extreme accuracy, the Johnson machine seems more applicable than the emery wheel.

ESTABLISHED USES.

When we come to the actually well-established uses of manganese steel, I must act the apologist. They are few. In addition to the inertia of custom, which properly leads each to cling to the material which does well enough rather than brave the ills he knows not of, we have the really serious obstacles which the very nature—indeed, the very advantages—of this alloy oppose to its use, and certain personal considerations on which I may touch but lightly.

The death of the senior Hadfield shortly after the invention of manganese steel threw on his son the cares of a very large and growing business, in addition to those of the development of manganese steel and of many other extremely promising alloys. There has been lack of laborers, rather than lack of promise of harvest.

The most important single use for manganese steel is for the pins which hold the buckets of elevated dredgers. Here abrasion chiefly is to be resisted; here manganese steel has given remarkable results, and here its use has, I believe, ceased to be tentative.

Another important use is for the links of common chain elevators. The manufacturer who uses them most reports that they last more than twice as long as carbon-steel links.

The Cyclone pulverizer consists of two propeller blades, set end to end, in a closed chamber, and revolving rapidly in opposite directions. The ore or other substance to be powdered is dropped between these blades. They are thus subjected at once to severe abrasion and to heavy blows; hence they must be tough and hard. While chilled cast iron is found to abrade slightly less under these conditions, yet it often breaks, causing serious accidents. Manganese steel has been found perfectly safe and has been regularly adopted. Besides many smaller uses a great many points and crossings for both steam and horse railroads have been made, but it is not yet known how the wear of manganese compares with that of carbon steel under these conditions.

Car wheels probably offer the most promising use for manganese steel. A car wheel must first of all be so tough and trustworthy that it will not break even under the trying conditions of use, and beyond this, it must resist abrasion; in short, it must have this combination of toughness and hardness which manganese steel offers. Several serious obstacles have retarded the introduction of manganese steel for this purpose, but we see our way pretty clearly to overcoming these completely. And I hope strongly to see manganese steel become the material for passenger-car wheels within a few years. I am less hopeful as regards freight car wheels, because the results are less serious when a cast-iron wheel breaks under a freight train than when it derails a passenger train.

The chief difficulty in the way of introducing manganese-steel car wheels has been the extreme hardness of the metal, which made it difficult to turn the tread and to bore the hub true. This difficulty is now well in hand. The tread may be turned by means of an emery wheel, the car wheel itself being mounted in a lathe and revolving slowly so as to bring each point in its tread in succession against the emery wheel.

The hub might be bored with an emery cone such as is used successfully for dressing out the conical steel dies through which steel bars are drawn cold. But an objection to this is that the purchaser of a car wheel may wish to bore out his wheel to fit a particular axle after it has left the maker's hands. Hence it will be better to weld or cast into the manganese-steel wheel a center of iron or soft steel, which can be bored readily.

Manganese-steel wheels under a one-horse tram car in Chester, England, were returned after running 80,000 miles. The service under horse cars is very trying, as the brakes are so often applied, and as so much sand and other gritty matter lies on the rails. The mileage on one of the most important street railroads in this country follows:

| Maker. | Number of wheels put in. | Number worn out. | Average mileage. |
|---|---|---|---|
| X.. .... | 515 | 293 | 7,748 |
| Y..... | 78 | 12 | 16,373 |
| Z... ... .... | 154 | 14 | 4,537 |

Of these three classes of wheels two were of cast iron and one of carbon steel.

I am informed that some manganese-steel wheels have run over 300,000 miles each without turning, on a New England railroad.

For gears exposed to excessive abrasion—*e. g.*, from grit—manganese steel commends itself.

For safes, also, it should be well fitted, as it can neither be broken by sledging, nor cut, nor drilled.

*Armor-Plate.*—It is to be expected that manganese steel should make excellent armor plates, for here hardness and toughness should be combined. The plate must be so hard that the shot does not penetrate it, yet so tough that it does not crack and let the water in; and such experimental data as we have indicate that it will fulfill this expectation.

[Engravings illustrated the effects of a shot on manganese steel; on carbon steel containing 0.25 per cent. of carbon; and on wrought-iron.] The wrought-iron plate was completely perforated; the carbon-steel plate was cracked through; three manganese-steel plates received in all four such shots, which in two cases penetrated ½ inch, and in the other two ⅝ inch. The manganese-steel plates became somewhat dished by the blows, as is roughly shown in Fig. 281, and in two cases a slight surface crack resulted around the inside of the hole.

A sliding ram had hard steel armor-piercing shot attached to its lower face, and was dropped from a hight of 8 feet upon these several plates, which were supported firmly on timber. The manganese-steel plates were 9 inches square and 0.75 inch thick. The conditions of this test do not, indeed, reproduce those of actual warfare; in the one case we have a great mass moving slowly, in the other a small mass moving swiftly.

NOTE.—I must caution the reader that, though I have tried to treat the subject judicially, allowance should be made for bias on my part, owing to direct pecuniary interest.

DISCUSSION.

G. C. Henning held, in opening the discussion, that manganese steel possesses certain peculiar properties. Under some conditions its resistance to compression was very slight, so much so that when placing in the testing machine the jaws crush the ends of the test piece before the limit of tenacity has been reached. In other words, while the metal would resist tension it would fall down under compression before the limit had been approached. He thought that it would have been better had tables 1 and 2 given the wear on the emery wheel and also on the shaft. The wear of the steel also ought to have been determined on other materials, on hard and smooth wheels, and when subjected to loose, but sharp, cutting edges. The tests of the axles were in a certain sense misleading, since it is not stated whether the axles were turned, as it is probable they were, at every blow, when each succeeding blow would have to overcome the deflection caused by the previous blows and the test would become severe. How these tests were made should be explained. Another point was where the hight of drop was measured from. It would make a great deal of difference if the drop was measured from the bearings or measured from the highest point of the axle. There were objections to the way of testing the wheels, which were dropped on their flanges. Instead of this a block should have been fixed on the tread and flange and the weight then dropped on it, as this method would have distributed the force of the blow more accurately than by that pursued.

Professor Rogers said that this steel had been recommended for standards of length. He had noticed that under the finest polish there were pits. He had lined a surface with 1000 lines to the inch. Blows of a hammer did not distort the lines.

Mr. Howe admitted in closing that manganese steel, considering its hardness, does not stand up well under compression, although under some conditions some kinds of manganese steel will stand compression. He said that in testing the axles the hight of drop was always measured from the bearings. He explained that the axles were turned after each blow. He further said that the increased cost of manganest steel was due solely to the first cost of the original material.

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Secretary Tracy has issued another advertisement inviting proposals for the construction of a steel twin screw seagoing torpedo boat. Under the former advertisement two proposals were received, but the Secretary decided to increase the size of the boat and change the plans in other respects, so that this readvertisement was made necessary. The proposals are to be opened on August 18. The boat will be about 120 tons displacement, and must be completed within 12 months after signature of the contract. The proposals may be under the Department's designs or in accordance with the bidders' designs. The minimum speed is 24 knots per hour, and provision is made for a bonus ranging from $2500 to $3500 for every ¼ knot speed above 24 knots, and for deductions of $2500 for every ¼ knot deficiency. The vessel may be accepted if she makes 22 knots per hour.

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The Pan-American Transportation Company, who were organized as a result of the Pan-American Congress, and chartered by the Alabama Legislature to operate steamships between this country and Central and South America, have opened books of subscription in Mobile, Ala. The directors organized by electing J. R. Clark president, F. C. Ruttan vice-president, F. L. Dana secretary and W. O. Culp treasurer. The capital stock is $10,000,000, with the privilege of increasing to $100,000,000. $1,000,000 has been subscribed.

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The special representatives of the Treasury Department in Europe to serve in connection with the admission of foreign exhibits for the World's Columbian Exposition are Charles H. Grosvenor of Ohio, John M. Butler of Philadelphia and Prof. John M. Ellis of Oberlin, Ohio.

## A New Belt-Testing Machine.*

BY GEO. I. ALDEN, WORCESTER, MASS.

A machine for testing belts should meet the following requirements: It should give accurately the sum of the belt tensions; the power transmitted, from which the difference of tensions can be readily found; the number of revolutions of the driving pulley; the number of revolutions of the driven pulley and the number of runs of the belt during the trial, and also during any interval of the trial.

It should be capable of adjustment to a constant load and to any load within the capacity of the belt it is proposed to test; to a change of load without changing the sum of the tensions; to any constant load with the sum of the tensions varied. It should give the arc wrapped by the belt on the driving and driven pulley and should record automatically the revolutions of the driving and driven pulleys and the runs of the belt.

The object of this paper is to describe a belt-testing machine designed for the Engineering Laboratory of the Worcester Polytechnic Institute, and built at the Washburn shops. Much of the design is the work of Wm. W. Bird, formerly an instructor in the institute.

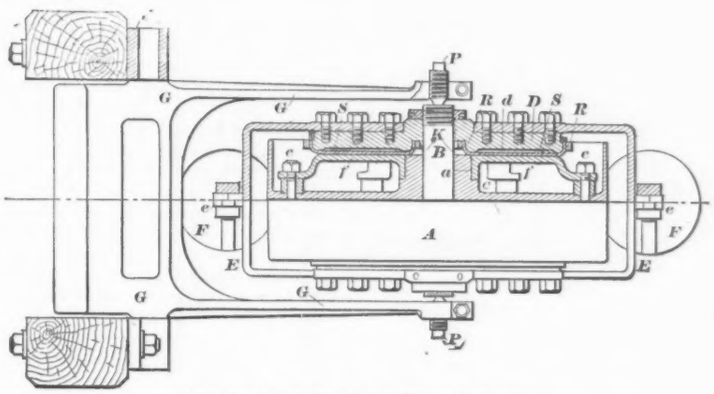


*Fig. 1.—Part Sectional Plan of Brake.*

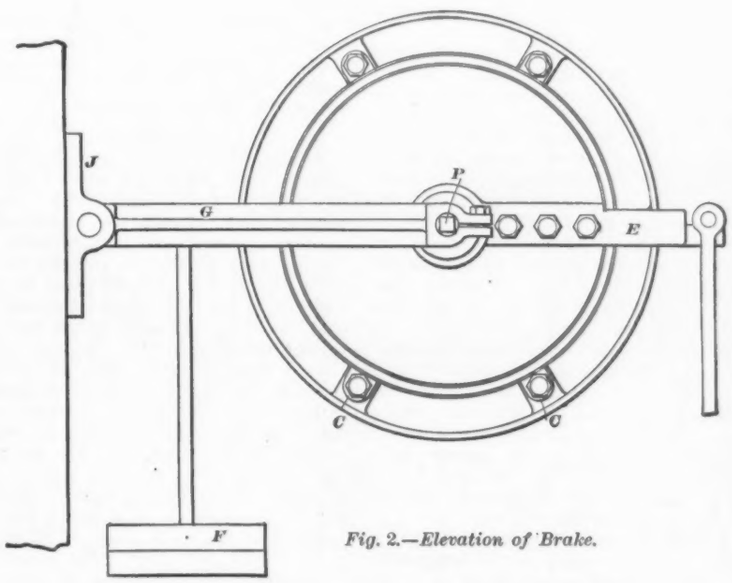


*Fig. 2.—Elevation of Brake.*

NEW BELT TESTING MACHINE.

The peculiar features of the machine are:

1. The attachment to the driven pulley of an automatic absorption brake, made on the principle of the dynamometer, described on page 958, Vol. XI, of the "Transactions" of the society.

2. The method of supporting the driven pulley, by which the weight of the pulley is taken by the tensions of the belt.

3. The recording apparatus.

The construction of the absorption brake and its attachment to the driven pulley is shown in Figs. 1 and 2. Fig. 1 is a part sectional plan and Fig. 2 an elevation. The pulley A turns freely on the shaft B. The hub of this pulley is turned down at *a*, and a cast-iron piece, C, is bored out, fitted upon the hub and bolted to the web of the pulley, as shown at *c c*. This cast-iron piece has its face F finished smooth. Another cast-iron piece D carries a copper disk *d*, which makes water-tight joints with the piece D by means of driven wrought iron rings, R R. Between the copper disk *d* and the cast-iron piece D is a space S S, to which city water is admitted through a pipe not shown in the drawing.

The forked arms E E are bolted to the piece D and carry projections *e e*, from which, by means of edge knifes and rods, are suspended the pans F F, which receive the weights used to balance the load, this load being the friction between the copper disk *d* and the piece C. The pressure which causes this friction is produced and regulated by the admission of city water to the space S. The rubbing surfaces *f* are lubricated by the admission of oil to the cavity K, the oil being carried slowly over the surfaces from the center to the circumference by centrifugal force, making the lubrication perfect. The heat generated is carried off by allowing the water, which presses the copper disk against the surface of the revolving piece C, to circulate freely to the brake.

The pulley and its connected parts are supported by the belt, and in order to keep the axle of the pulley horizontal, a balancing frame, G, is provided. This frame is hung in adjustable bearings, J, and its weight is so distributed that its center of gravity is on the axis of the bearings. Pins *p*, with conical ends, engage with the ends of the shaft on which the pulley revolves, in the manner shown in Fig. 1, so that while the balancing frame does not affect the weight which comes on the belt, it prevents oscillation of the pulley axle, and at the same time allows the pulley to adjust itself to the stretch of the belt.

Fig. 3 is an elevation of the machine, in which M is the driving and B the driven pulley. The speed of the driver may be varied in any usual way. S is a shaft, which receives a slow positive rotary motion from the shaft of the driver by means of a worm, T, and a train of gearing.

The shaft S carries a wheel, W, having at uniform distances on its face sharp points, by means of which the revolution of the wheel gives a positive motion to a strip of paper, which is thus transferred from the spool L to another spool just behind L, Fig. 3, the paper being kept at a constant tension by means of small weights, which, acting upon cords wound around the spool axles, actuate the spools. The sharp points in the face of the wheel W leave prick marks upon the paper, the distance between two consecutive marks representing 50 revolutions of the driver. Upon one element of the face of the wheel W is a pair of points which serve to mark on the paper a length equal to the circumference of the wheel W, this length representing 600 revolutions of the driver.

A pencil, P, carried by an arm, *l*, and pressed by a spring against the paper, as it moves with the face of the wheel W, records a line on the paper. As often as a certain point in the belt passes a given fixed point the pencil is actuated by an electro-magnet, and records a notch in the line upon the paper.

The number of revolutions of the driven pulley B are recorded in a similar manner, except that as the driven pulley revolves on its axle rotary motion is communicated to the shaft T by a cam, *c*, in the rim of the driven pulley, which cam operates a click which engages with a toothed wheel, V, upon the shaft T.

The machine is operated as follows:

The belt being adjusted upon the pulley, weights are placed in the pans, which, together with the weight of the machine, constitute the sum of the belt tensions.

These weights are so distributed in the two pans as to give the desired load.

Power is applied to the shaft of the driver, and the machine attains its normal speed.

The city water is then admitted to the brake in the driven pulley, and is so regulated, either by an automatic valve or by an attendant, as to cause the friction of the brake to balance the weights in the pans.

The experimenter, standing near the recording apparatus, holds his watch, and at the instant he desires to begin the test, turns a switch and notes the time. During the test a button may be pressed at regular intervals, and a mark recorded. These marks divide the whole record into any desired number of sub-records, each

* Presented at the Providence meeting of the American Society of Mechanical Engineers (1891).

complete in itself, but representing a shorter run.

The object of making these sub-records is to ascertain whether the total slip for the trial is uniform or intermittent.

The test is closed by throwing out the switch and noting the time The two records are then examined, and the data obtained may be written upon the ends of the ribbons, which are coiled and filed away for future reference.

In summarizing the advantages of the machine, it may be noted:

1. That it requires no calibration except the weighing and measuring of the parts.

2. It has no errors except such as are due to imperfect construction, and these may be reduced to any desired minimum.

3. It does not require, during the trial, observations in which the errors or the personal equation of the experimenter are included.

4. The axis of the driver being virtually above that of the driven pulley, the arc wrapped by the belt on each pulley can be accurately determined.

5. It furnishes a complete and accurate record of the pulley revolutions and belt runs, from which the slip of the belt on each pulley may be computed.

6. It has but few parts and is operated with ease and convenience.

The discussion of the results obtained by experiments with the machine is reserved until more abundant data have been obtained.

## Uniform Bill of Lading.

The New York Board of Trade and Transportation has adopted the bill of lading put forward by the National Transportation Association at its recent meeting at Chicago, and the text of which is given below :

Official uniform bill of lading for interstate commerce.

. .. ..... .....R. R. Co.

.... .... ..... 189...

Received for transportation from..... ..... in apparent good order, except as noted, the property described below (value unknown), marked and consigned as indicated below, and subject to carriers' liabilities as laid down by the common law in force in the various States, Territories, provinces or foreign countries through which the property must pass.

The rate of freight upon the property herein described shall not exceed. .....per .... ....

| Marks and consignments. | Description of articles. | Weights subject to correction. |
|---|---|---|

It is intended to submit this bill to Congress at its next session, with the request that such measures be taken as shall be deemed advisable to compel the carriers of the United States to furnish all shippers with bills uniform with it or with a similar one in which the common law liability only of said carrier shall be expressed, and also the early establishment of a uniform classification, the rules and conditions of which shall be just and reasonable.

The work is to be pushed forward by the National Transportation Association, which is composed of delegates from various business organizations throughout the United States. It has sent to all the commercial organizations of the country a circular letter urging immediate action on their part.

Representing the most influential business organization of the country, and a membership of more than 20,000 business men, this association insists that in framing a bill of lading the merchant should at least be consulted ; nay, more, that he should have an equal voice in its construction. Railroads are made for the public, and not the public for the railroads. An early opportunity will be given by the Interstate Commerce Commission to hear all parties interested upon this subject of vital interest to the business concerns of the several States.

The subject of a uniform classification is likewise an important one, and is conceded by the transportation lines on the one hand and merchants on the other to be imperatively demanded.

## Chicago Industrial Statistics.

A recent publication by the city authorities of Chicago is of some statistical interest. According to this report there are 407,000 persons pursuing gainful occupations, out of a total population of about 1,200,000. About 200,000 of these are engaged in productive industry, otherwise manufactures. The largest number of persons employed by any one concern is 6775, who are on the pay rolls of Armour & Co., the meat packers. Of these 275 are women. The next largest employer of labor is the Illinois Steel Company, whose works in Chicago kept 5025 men busy in 1890. A single railroad company, the Chicago and Northwestern, have 5100 names on their list of employees within the city limits. Nearly 7000 men work on the street railways. In one retail dry goods store 1200 male clerks and 1800 female clerks are employed. Another employs 900 females and 600 males. The retail trade of the center of the city has developed remarkably in the direction of department stores, of which there now are 13 of very large proportions, furnishing employment for one-fifth of the total number of persons who work for the retail trade in the whole city. The industry making the largest showing for women is the manufacture of clothing, in which there are 7750 women employed. The industry employing the most men is that of meat packing, in which 24,000 are engaged. Prominent among gainful operations is saloon keeping, the saloons numbering 5650, furnishing occupation to 17,050 men and 3900 women. The saloons in which women are employed are a combination of boarding house and saloon. The importance of the building interests is shown by the statement that 22,500 males and 185 females are employed by 1460 builders and contractors.

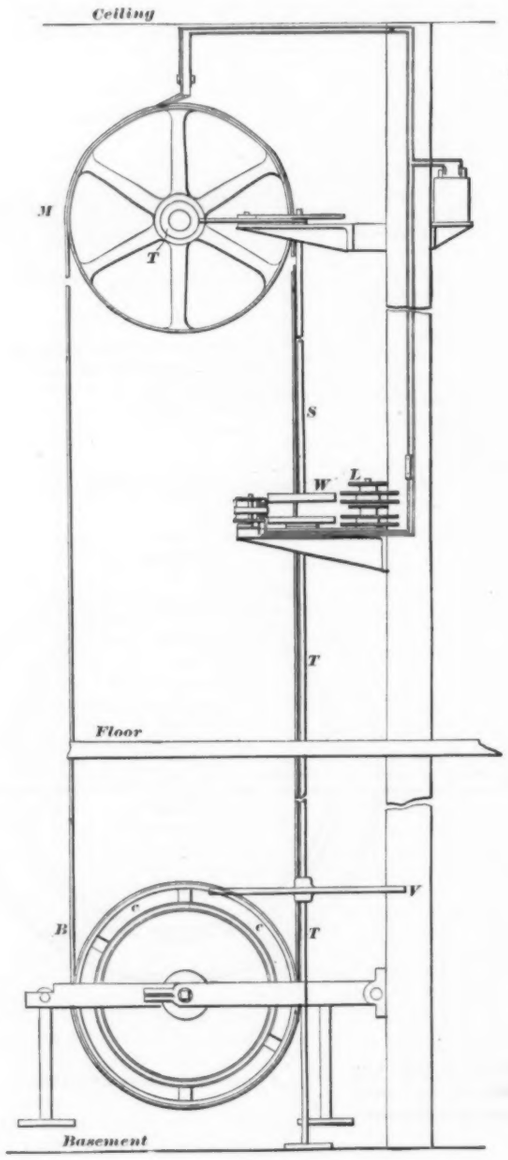


*Fig. 3.—Elevation.*

NEW BELT TESTING MACHINE.

## Steel Castings.*

H. L. GANTT, PHILADELPHIA, PA.

During the past few years steel castings have come extensively into use in the construction of machinery. The great power and size of many machines now being built demand a metal stronger than cast iron, and steel seems to be the most suitable substitute. Steel castings, however, have not given universal satisfaction by any means.

One man complains that they are not true to pattern; he has been using iron castings and expects those of steel to be as accurate as the iron ones. A little consideration will show that such expectation is unreasonable. Steel castings not only shrink much more than iron ones, but with less regularity. If iron castings are made from approximately the same grade of metal they will be very nearly uniform in size. With steel castings the amount of shrinkage varies with the composition and the heat of the metal; the hotter the metal, the greater the shrinkage; and, as we get smoother castings from hot metal, it is better to make allowance for large shrinkage and pour the metal as hot as possible. Then all castings should be thoroughly annealed, and in doing this a heavy scale is formed, leaving the casting pitted; this is very marked if the metal has been a little cool in pouring. We must not, therefore, expect to find steel castings as true to pattern as iron ones. The safest thing to do is to allow $\frac{3}{16}$ or $\frac{1}{4}$ inch per foot in length for shrinkage, except in very heavy castings, where $\frac{1}{8}$ inch is sufficient, and $\frac{1}{4}$ inch for finish on all machined surfaces except such as are cast "up." Cope surfaces which are to be machined should, in large or hard castings, have an allowance of from $\frac{5}{8}$ to $\frac{1}{2}$ inch for finish, as a large mass of metal slowly rising in a mold is apt to become crusty on the surface, and such a crust is sure to be full of imperfections. On small, soft castings $\frac{1}{8}$ inch on drag side and $\frac{1}{4}$ inch on cope side will be sufficient. No core should have less than $\frac{1}{4}$ inch finish on a side, and very large ones should have as much as $\frac{1}{2}$ inch on a side. This seems a great deal, but will be found economical in the long run.

Another man will say that so many castings have "blow holes" in them. This is undoubtedly true, but unless the holes are so large as to make the appearance of the casting very bad, or occur on a wearing surface, they should not give any anxiety, as such metal is always tougher than solid metal of the same hardness. Blow holes can be entirely prevented in castings by the addition of manganese and silicon in sufficient quantities, but both of these cause brittleness, and it is the object of the conscientious steel maker to put no more manganese and silicon in his steel than is just sufficient to make it solid. Working with this object in view, he occasionally fails to get quite enough in to make his castings entirely free from blow holes, while one who is simply aiming at solid castings regardless of quality gives his metal a dose of silicon which is sure to make it solid; and if there should already be a little more silicon in the metal than he is counting upon his castings will be beautifully smooth and solid, but brittle and far inferior to those with the blow holes in them. If such castings are to replace iron ones which have broken, they will, as a rule, be good enough; but if they are for new work and good tough castings have been counted upon, they will be very apt to fail.

Another complaint is that many of the heavy sections on being cut into are found to contain large shrinkage holes. This is true, but most people do not consider the excessive shrinkage of steel in designing their castings, but make them just as if they were to be cast of iron. An iron founder can always get hot metal from his cupola to feed any casting as long as it continues to shrink. The steel founder taps all the metal from his furnace at once, and it is necessary that the casting shall be so designed and the sinking heads so placed that it shall need no more feeding. In order to get such a casting solid it must cool from the bottom up, and the sinking heads must be the last portions to chill or set. In other words, every portion of the casting must have a fluid connection with the sinking head until it is solid. The necessity, therefore, for designing steel castings in such a way that the heavy portions may be cast "up" with sinking heads on them is much greater than in cast iron, for many a section which in cast iron would have scarcely any shrinkage hole in it would in steel be so badly shrunk as to be unfit for use It will follow also that the section of the sinking head must be greater than any portion of the casting to enable it to retain its heat until the whole of the casting is set.

The best results are arrived at when all portions of the castings are of a uniform thickness, or very nearly so. In such a case there is but little danger of shrinkage holes, and the even cooling will, as a rule, cause the casting to retain its shape and be true to pattern; while those in which the sections vary very much in thickness are apt to depart a good deal from the pattern by warping from unequal cooling.

Another and very serious trouble is the tendency which castings have to crack in cooling. These cracks, or "pulls," as they are generally known, take place just after the steel has passed to the solid state and when it is still greatly lacking in tenacity. The contraction of the casting begins very soon after it has become solid, and unless every portion is free to shrink there may not be strength enough in the metal to overcome the resistance offered by the sand in the mold and to pull the different parts together, and a crack will open in the hottest or softest part. If there is much variation in the thickness of the metal it is almost impossible to prevent the formation of cracks where heavy and light sections join. If, on the other hand, the casting is of uniform thickness throughout, such a tendency is reduced to a minimum, as there are no very soft places for cracks to start. All inside corners should have large fillets in them, as such corners when sharp almost always crack open. The tendency of castings to "pull" makes it very desirable that they should be as simple in construction as possible. For instance, it is better to bolt several small castings to one large one than to complicate the large one by casting small projections on it. In case of the built-up structure we know exactly what we have, but when a number of brackets and knobs are cast on, we may never know the cracks or defects until something breaks off.

The principal cause of the difficulties in filling specifications on castings for the United States Navy Department is that all designs are made, not with special reference to avoiding difficulties in casting, but with the purpose of getting the strength needed with the least possible weight of metal. The result is that the castings are often very complicated, and as each new shape is necessarily an experiment, are very expensive. In many cases, also, there are, no doubt, shrinkage holes in the centers of the castings, but usually such holes are not suspected until the casting breaks. In the majority of such cases the steel founder has done all he can to prevent shrinkage, but the design of the casting is such as to cut off fluid connection from the sinking head to some portions of the castings before such portions are set. Steel founders should decline to make such castings as will surely contain serious shrinkage holes, or at least warn their customers that such will be the case, and make an effort to have the design modified. It is a good plan for those not practically familiar with the manufacture of steel castings to submit to those who are designs of any large or important castings before making the patterns, as in many cases unimportant changes may be made in the design and much better castings secured. Work will often be much expedited by consulting the founder about the way of making the pattern, as it is often necessary to pour a steel casting in a position very different from that in which an iron one would be cast.

In an earlier part of this paper it was stated that the fracture of an unannealed steel casting very much resembled that of burnt steel. The behavior of an unannealed steel casting also resembles that of an overheated forging. Its chief characteristic is its brittleness when subjected to shock. Hard castings have this property to such a marked degree that sinking heads are often broken off by the shock of chipping off the runner, in which case they nearly always carry a large piece of the casting with them. Such castings, unless containing large amounts of manganese and silicon, become tough and reliable when annealed, and show a fine even grain upon fracture. Another effect of annealing is to equalize the strains of cooling. These strains are sometimes so great as to cause the casting to crack open with a loud report. This happens not only in hard steel, but also in steel low in carbon. As an illustration of this the cracking of a large gear wheel may be cited weighing 8000 pounds (carbon 0.34 per cent.). The wheel had been cast several days and was about half cleaned. It was left in a perfect condition one evening and found the next morning with a crack half way across one of the arms.

The following table will illustrate the effect of annealing on tensile strength and elongation:

| Carbon. Per cent. | Annealed. | | Annealed | |
|---|---|---|---|---|
| | Tensile stren'th. | Elongation. Per cent. | Tensile stren'th. | Elongation. Per cent. |
| 0.23 | 68,738 | 22.40 | 67,210 | 31.40 |
| 0.37 | 85,540 | 8.20 | 82,228 | 21.80 |
| 0 53 | 90,121 | 2.35 | 106,415 | 9.80 |

In the above table the unannealed and annealed specimens having the same carbon were in each case taken from the same runner of a casting and very close to each other. On considering this table the value of annealing becomes immediately evident, as does the absolute necessity for it in case of hard castings. The proper annealing of large castings takes nearly a week, and when we remember that all-steel castings are made in dry sand molds, and have sinking heads on them which in most cases have to be cut off in the machine shop, it will be evident that they should be ordered three or four weeks before they are needed.

One more complaint of frequent occurrence is that the metal is too hard or too soft, no specifications having been given except that the castings shall be of steel. In such a case the manufacturer has probably put in the casting the grade of metal which he considered best for the work it was to do, but his judgment will often differ from that of the purchaser. Our experience with steel gears, and especially with roll pinions, is that they do no'

*Presented at the Providence Meeting of the American Society of Mechanical Engineers (1891).

break, as a rule, but wear out. Consequently we make them hard, pinions being made hardest. The result of this has been that some have complained that they were so hard they could not be machined. For people who have their machines speeded to cut cast iron only they are, of course, too hard, but if it is desired to get good wear it is much better to slow down the machine and use hard steel for such castings. One objection to hard steel is the tendency which it has to form blow holes, and consequently the strong inducement to add large quantities of silicon and manganese to the metal to make it solid. It is in high-carbon steels that silicon is specially objectionable, for while annealing will greatly diminish brittleness due to carbon, it does not appear to have much effect on that due to silicon. Another essential in the production of solid castings of high-carbon steel is that the metal shall be very hot. Consequently small castings and those having very thin sections will often contain blow holes, while a thick, heavy casting made from the same metal will be perfectly solid. As large and small castings are usually made from the same ladle of metal, it is considered preferable to run the risk of having a few blow holes in small castings rather than have the large ones unnecessarily brittle. Such blow holes are usually very close to the surface and may in general be gotten rid of by allowing a little extra metal for machining. In the case of small gearing they show up in the teeth, but our experience has been that such gears wear far better than softer ones, which can be easily made solid.

The proper steel for roll pinions, hammer dies, &c., seems to be that containing about 0.60 per cent. of carbon. Such castings properly annealed have worn well and seldom broken. Miscellaneous gearing should contain carbon 0.40 per cent. to 0.60 per cent., gears large in diameter being softest. General machinery castings should, as a rule, contain less than 0.40 per cent. of carbon, those exposed to great shocks containing as low as 0.20 per cent. of carbon. Such castings will give a tensile strength of from 60,000 to 80,000 pounds per square inch and at least 15 per cent. extension in a 2-inch long specimen.

Machinery and hull castings for the war vessels now being built for the United States Navy, as well as carriage for naval guns, contain from 0.20 per cent. to 0.30 per cent. of carbon. The smaller gun carriages are subjected to a ballistic test, in which the casting is pierced by two shots from a 3 pounder Hotchkiss rapid firing gun, the shots striking not less than four diameters apart. If the metal shows a tendency to crack seriously the casting is condemned, as are all others made from the same heat. Castings for the hull and machinery of the ships are subjected to a bending test, in which an inch square bar is bent at right angles around a radius of 1½ inches. If the bar shows any serious cracks the casting is condemned.

In designing machinery the question often arises as to which will give the desired result most economically, a steel or an iron casting, and is sometimes quite difficult to settle without making both designs and getting prices. If a few facts about the relative size of steel and iron castings of the same strength be borne in mind they will greatly help us in this matter.

With reference to strength, it has been noted that good castings for general machinery work will give 60,000 to 80,000 pounds tensile strength and 15 per cent. extension. Where strength and not stiffness is required, a structure of such material will resist a strain of 15,000 pounds per square inch with greater safety than one of cast iron will resist 5000 pounds; especially if subjected to shocks. It follows, then, that if the castings are large, a steel casting to stand the same strain as an iron one need only be about one-third as heavy. In the case of small castings the use of steel will generally allow us to make them somewhat lighter, but the same proportion will not hold good, as the difficulty of making a perfect steel casting increases very rapidly as the sections become very thin. In general small steel castings will be found to cost proportionately more and to be less satisfactory than large ones. They come into use where iron castings will not answer, while large steel castings will often take the place of iron ones on the score of cheapness alone.

The following is a partial list of castings in which steel seems to be rapidly taking the place of iron: Hydraulic cylinders, crossheads and pistons for large engines, roughing rolls, rolling-mill spindles, coupling boxes, roll pinions, gearing, hammer heads and dies, riveter stakes, castings for ships, car couplers, &c.

Perhaps the one class of castings which is of most general interest is that of gearing. A few years ago steel castings were so rough that it was necessary to cut all steel gears; but now this difficulty has been practically overcome, and while they will never be as smooth as good iron ones, uncut steel gears, even of small sizes, are giving perfect satisfaction in many places, and are now used by the Midvale Steel Company almost to the entire exclusion of iron ones.

DISCUSSION.

Mr. Webber urged that the most serious objection to steel castings from the manufacturers' standpoint was that the steel men promise them in three weeks, and the buyer is lucky if he gets them in three months.

Oberlin Smith reported that he had had favorable results in his experience with steel castings. Others said that the trouble in obtaining good castings with steel was always to be found in the pattern. In four cases out of five it was stated that the result was an experiment, owing to complicated shapes.

Mr. Davis informed the meeting that he had had good experience with steel castings for the Texas, now building for the Government at the Richmond Locomotive Works, and that as yet not one had been returned to the steel men. They had had more difficulty in getting good boiler plates for the boilers than in obtaining steel castings for the engines.

Charles H. Parker of Edward Kendall & Sons, Cambridgeport, Mass., reported that they had been engaged upon some work for the Government, which was required to stand 160 pounds pressure, to be tested at 240 pounds pressure. They finished the work and tested it at 300 pounds pressure in order to make sure that it would pass the inspector. This test developed several small blow holes, which in no way affected the strength of the material, and which could be very readily plugged. Nevertheless, the Government refused to accept the work.

H. M. Howe insisted that much of the difficulty in obtaining perfect castings could be obviated by putting on top of the mold a white hot piece to keep the upper metal hot and to permit the feeding and at the same time to insure cooling from the bottom.

Thomas R. Morgan, Sr., president of the Morgan Engineering Company, said that his firm had had excellent castings from many steel men. The making of sound castings is an industry requiring skill and long experience. It demanded in order to insure success the highest class of workmen. One difficulty which had always worked and still works against success is the price. The Government pays and gets good results. Manufacturers do not pay and sometimes have cause for complaint. He thought that if those needing steel castings would pay a just price there would be no difficulty whatever in whatever in obtaining just what they wanted. He further said that a one, two or three throw crank could not be fed from one point. It should, in order to make success certain, be fed at each crank.

Mr. Gantt in reply to various remarks said that in annealing castings of steel it was essential to heat them very slowly. The hot-top suggestion was a good one, but in cases where many molds must be poured from the same ladle the handling of so many pieces becomes a serious objection and renders the idea impracticable.

## New Trade Regulations.

The Congress of Chili has passed an act providing that hereafter all import duties and storage charges must be paid in gold or silver calculated on bills at 38 pence. This decree has had the effect of enhancing the price of all imported goods, and it is stated that the increase has been generally between 125 and 150 per cent.

Notice is given from the consular office in New York that all shipments of merchandise to the Republic of Salvador, arriving there by any route other than the Magellan Straits on and after July 16, via the Magellan Straits on and after October 16, must be accompanied by cerfied invoices, according to law. The following rules must be observed: Invoices must be presented in triplicate, written in either Spanish or English, and must state the number of bales, cases, barrels, or in whatever form the merchandise is shipped; the mark and number of each package and its gross weight, excepting machinery, iron and wood, which may be invoiced as a total; the name and kind of merchandise and its value estimated in the current money of the Republic in dollars, or in the money with which the goods have been paid. Invoices must be clearly written; none having anything written between lines, alterations or erasures, can be accepted.

Assistant Secretary Spaulding has informed the president of the Michigan Central Railroad Company that partly worn steel of American manufacture used for repairs of the main track of that road in Canada (the Canada Southern division) may be returned to the United States for use on branch lines in Michigan or elsewhere without payment of duty, provided its identity as such domestic manufacture is established to the satisfaction of the Collector of Customs at the port of entry.

It is rather a curious fact that the rapid exhaustion of the Iowa coal deposits did not trouble the mine owners when their mines were in active operation. The Iowa miners have been on a strike for the past six weeks, and the startling announcement has just been put forth that the coal fields of a considerable part of Iowa have been discovered to be shallow basins or pockets instead of inexhaustible veins, and that a number of workings will have to be abandoned at an early day. The statement is received with a great deal of incredulity under the circumstances. It may be possible that facts long known with regard to certain mines are now brought forward as newly-discovered conditions for special reasons, either to influence the strikers or to enhance the price of coal.

Salvador and Guatemala, instead of fighting, have wisely concluded a treaty of peace. The Central American republics seem to avail themselves of better prospects by engaging with new vigor in various public enterprises.

# Mechanical Engineers.

## PROVIDENCE MEETING.

The twenty-third meeting of the American Society of Mechanical Engineers was held in Providence last week It was by far the largest meeting, in point of number of members present, ever held by the society, was a most interesting one when reviewed from the standpoint of the papers presented and the discussions arising therefrom, and one of the most valuable ever held when the various points of interest in and about Providence which were visited are considered.

Among the members present were the following:

Alden, George I., Professor Mechanical Engineering Polyt. Institute, Worcester, Mass.
Allison, Robert, Franklin Iron Works, Port Carbon, Pa.
Almond, Thomas R., Brooklyn, N. Y.
Ames, William Lewis, Professor Mechanical Drawing Rose Polyt. Institute, Terre Haute, Ind.
Anthony, Gardner C., Director R. I. Technical Drawing School, Providence, R. I.
Archer, Edward R., Chief Engineer Tredegar Iron Company, Richmond, Va.
Ashworth, Daniel, Pittsburgh, Pa.
Babbitt, George Rodney, Superintendent W. A. Harris Steam Engineering Company, Providence, R. I.
Baldwin, Stephen W., Pennsylvania Steel Company, New York.
Ball, Frank H., of the Ball & Wood Engine Company, New York.
Barnaby, Chas. W., Phenix Iron Works, Meadville, Pa.
Barnes, Abel T., Consulting Engineer (for B. F. Sturtevant), Jamaica Plain, and 23 Oakdale street, Jamaica Plain, Mass.
Barnum, George S., Treasurer the Bigelow Company, New Haven, Conn.
Barr, John H., Professor Mech. Engineering University of Minnesota, Minneapolis, Minn.
Barrus, George H., Expert and Cons. Steam Engineer, Boston, Mass.
Baugh, Samuel Andrew, Superintendent Baugh Steam Forge Company, Detroit, Mich.
Bigelow, Frank L., Secretary the Bigelow Company, New Haven, Conn.
Binsse, Henry Leon, Newark Machine Tool Works, Newark, N. J.
Bird, William W., Superintendent Broadway Iron Foundry, Cambridgeport, Mass.
Bond, Geo. M., Manager Gauge Department, Pratt & Whitney Company, Hartford, Conn.
Borden, Thomas J., President Richard Borden Mfg. Company, Fall River, Mass.
Boyd, Jas. T., General Manager Stearns Mfg. Company, Erie, Pa.
Britton, J. W., President Britton Iron and Steel Company, Cleveland, Ohio.
Brown, C. H., C. H. Brown & Co., Fitchburg, Mass.
Bulkley, Henry W., New York.
Cheney, Walter L., Secretary Meriden Machine Tool Company, Meriden, Conn.
Conrad, Hugh Vincent, Rand Drill Company, New York.
Creelman, Wm. J., Engineer Woodbury Engine Company, Rochester, N. Y.
Cremer, James M., H. R. Worthington Hydraulic Works, South Brooklyn, N. Y.
Darling, Edwin, Superintendent Pawtucket Water Works, Pawtucket, R. I.
Davis, E. F. C., General Manager Richmond L. & M. Works, Richmond, Va.
Davis, Isaac H., Westinghouse, Church, Kerr & Co., New York.
Deane, Charles P., Treasurer Deane Steam Pump Works, Holoyoke, Mass.
Denton, James E., Professor Experimental Mech. Stevens Inst. Tech., Hoboken, N. J.
Derbyshire, Wm. H., Bement, Miles & Co., Philadelphia, Pa.
Doane, Wm. H., President J. A. Fay & Co., Cincinnati, Ohio.
Doran, William S., H. R. Worthington, New York.
Du Villard, Henry A., Granger Foundry and Machine Company, Providence, R. I.
Eberhardt, F. L'H., E. Gould & Eberhardt, Newark, N. J.
Gale, Horace B., Professor Washington University, St Louis, Mo.
Gantt, Henry L., Midvale Steel Works, Philadelphia, Pa.
Gobeille, Jos. Leon, Cleveland, Ohio.
Gordon, Fred. W., Gordon, Strobel & Laureau, Philadelphia, Pa.
Hall, Albert Francis, George F. Blake Mfg. Company, Charlestown, Mass.
Hardie, Robert, Assistant Mechanical Engineer De La Vergne Refr. Machine Company, New York.
Henning, Gustavus C., New York.
Henthorn, John T., Remington & Henthorn, Mechanical Engineers, Providence, R. I.
Holloway, J. F., New York.
Howe, Henry M., Boston, Mass.
Hunt, Chas. Wallace, New York.
Hunt, Robert W., Robert W. Hunt & Co., Chicago, Ill.
Hutton, Frederic R., Professor School of Mines, Columbia College, New York.
Hyde, Charles E., Marine Engineer Bath Iron Works, Bath, Maine.
Ide, Albert L., Proprietor and Engineer Ide Engine Works, Springfield, Ill.
Jacobus, D. S., Assistant Professor Experimental Shop Work and Mechanics Stevens Institute, Hoboken, N. J.
Jones, Edwin H., President and General Manager Vulcan Iron Works, Wilkesbarre, Pa.
Kent, Wm., New York.
Kirchhoff, Charles, Editor *The Iron Age*, New York.
Kneass, Strickland L., Sellers & Co., Philadelphia, Pa.
Lane, Harry M., President Lane & Bodley Company, Cincinnati, Ohio.
Lane, J. S., General Superintendent M. C. Bullock Mfg. Company, Chicago, Ill.
Lewis, Wilfred, Assistant Engineer for Wm. Sellers & Co., Incorporated, Philadelphia, Pa.
McBride, James, Superintendent of the New York Dye Wood Extract and Chemical Company, Brooklyn, N. Y.
McLeod, Howard D., Pittsburgh Iron and Steel Engineering Company, Pittsburgh, Pa.
May, De Courcy, I. P. Morris & Co., Philadelphia, Pa.
Miller, Alexander, Brown & Miller, Jersey City, N. J.
Miller, James S., Mechanical Engineer and Chief Draftsman Stearns Mfg. Company, Erie, Pa.
Miller, T. Spencer, New York.
Morgan, Thomas R., Sr., President and Treasurer Morgan Engineering Company, Alliance, Ohio.
Morgan, T. R., Jr., Secretary and General Manager Morgan Engineering Company, Alliance, Ohio.
Morgan, W. H., Electrician Morgan Engineering Company, Alliance, Ohio.
Muller, Edward A., Vice-President and Superintendent Bradford Mill Company, Cincinnati, Ohio.
Nason, Carleton W., President Nason Mfg. Company, New York.
Nicholson, Stephen, Vice-President and Treasurer Nicholson & Waterman, Providence, R. I.
Nicholson, W. T., President Nicholson File Company, Providence, R. I.
Park, William R., Superintendent and Mechanical Engineer Park Mfg Company, Boston, Mass.
Parker, Chas. H., Edward Kendall & Sons, Cambridgeport, Mass.
Parkhurst, E. G., Assistant Superintendent Pratt & Whitney Company, Hartford, Conn.
Parks, Edward H., Mechanical Engineer Brown & Sharpe Mfg. Company, Providence, R. I.
Payne, David W., Payne Engineering Company, Elmira, N. Y.
Peabody, Cecil H., Associate Professor Steam Engineering Massachusetts Inst. Tech., Boston, Mass.
Penney, Edgar, General Superintendent Frick & Co., Waynesborough, Pa.
Philp, C. v., Bethlehem Iron Company, Bethlehem, Pa.
Phillips, Franklin, Hewes & Phillips Iron Works, Newark, N. J.
Pickering, Thomas R., Pickering Governor Company, Portland, Conn.
Porterfield, Henry A., Engineer of Tests Carnegie Bros. & Co., Pittsburgh, E. E., Pa.
Rice, Richard H., Chief Draftsman E. D. Leavitt, Cambridgeport, Mass.
Richards, Charles B., Professor Mechanical Enginering Sheff. S. S., Yale University, New Haven, Conn.
Richards, Francis H., Engineering and Patent Offices, 253 Main street, Hartford, Conn.
Robertson, R. A., Jr., Treasurer Builders' Iron Foundry, Providence, R. I.
Roelker, H. B., New York.
Rogers, Wm. A., Professor Physics Colby University, Waterville, Maine.
Roney, W. R., Mechanical Engineer Westinghouse, Church, Kerr & Co., Chicago, Ill.
Russel, Walter S., Vice-President and Manager Russel Wheel and Foundry Company, Detroit, Mich.
Russell, C. M., Secretary Russell & Co., Massillon, Ohio, and President Standard Horse Nail Company, New Brighton, Pa.
Sancton, Edward K., Superintendent Penn Avenue Works Dickson Mfg. Company, Scranton, Pa.
Schwanhausser, William, General Foreman Hydraulic Works H. R. Worthington, South Brooklyn, and 461 Eighth street, Brooklyn, N. Y.
See, Horace, Engineer and Naval Architect, New York
Sellers, Coleman, Jr., Assistant Manager Wm. Sellers & Co., Incorporated, Philadelphia, Pa.
Sharp, Joel, President Buckeye Engine Company, Salem, Ohio.
Sims, Gardiner C., General Manager Armington & Sims Engine Company, Providence, R. I.
Smith, George H., Beaman & Smith, Providence, R. I.
Smith, Jesse M., Mechanical and Electrical Engineer, Detroit, Mich.
Smith, Oberlin, President Ferracute Machine Company, Bridgeton, N. J.
Smith, Scott A., Proprietor Providence Oil Company and Vice-President Providence Mut. S. B. Ins. Company, Providence, R. I.
Spaulding, Hollon C., General Manager Thomson-Houston Motor Company, Boston, Mass.
Springer, J. H., Sr., Superintendent Niles Tool Works, Hamilton, Ohio.
Stiles, Norman C., Stiles & Parker Press Company, Middletown, Conn.
Suplee, Henry H., Mechanical Engineer Yale & Towne Mfg. Company, Stamford, Conn.
Swasey, Ambrose, Warner & Swasey, Cleveland, Ohio.
Sweet, John E., Straight Line Engine Company, Syracuse, N. Y.
Thomson, John, Mechanical Engineer and Manufacturer Water Meters and Printing Machinery, New York.
Thorne, Wm. H., Wm. Sellers & Co., Incorporated, Philadelphia, Pa.
Wales, Chas. M., Cleveland City Forge and Iron Company, New York.
Wallace, William, President and Manager Wallace & Sons Brass and Copper Company, Ansonia, Conn.
Watts, George W., Mechanical Engineer Niles Tool Works, Philadelphia, Pa.
Webb, J. Burkitt, Professor App. Math. Stevens Inst. Tech., Hoboken, N. J.
Webber, William Oliver, General Superintendent Erie City Iron Works, Erie, Pa.
Wheeler, F. Meriam, George F. Blake Mfg. Company and Wheeler Condenser and Engineering Company, New York.
Wheelock, Jerome, Worcester, Mass.
Whitehead, George E., Superintendent Nut and Bolt Works, Rhode Island Tool Company, Providence, R. I.
Whitney, Edwin H., Mechanical Engineer American Ship Windlass Company, Providence, R. I.
Wilcox, John F., Engineer, Secretary Pittsburgh Iron and Steel Engineering Company, Pittsburgh, Pa.
Wiley, Wm. H., New York.
Wood, De Volson, Professor Engineering Stevens Inst. Tech., Hoboken, and Boonton, N. J.
Woodbury, C. J. H., Vice-President Manufacturers' Mut. Ins. Company, 31 Milk street, Boston.
Worthington, Charles C., H. R. Worthington, New York.
Wyman, Horace W., Wyman & Gordon, Fitchburg, Mass.

At the opening session Tuesday morning the Mayor of Providence, the Hon. Charles Sidney Smith, welcomed the guests on behalf of the citizens. In his remarks he dwelt upon the fact that Providence possesses vast manufacturing interests, stating that the city, counting its jewelry and silverware establishments, its enormous works for the production of screws, tools, general machinery, steam engines, electrical apparatus and other important industries, had something like $300,000,000 employed annually in the purchase of raw material and the sale of the products. He said: "We boast that we manufacture the fastest locomotives, best engines, both great and small; most serviceable screws, the finest silverware and the best files and the most of them. There seems to be nothing in the mechanical line that we do not produce except watch movments, and I am told that a watch factory will be in operation here in a few months, arrangements having been completed for the plant." He then dwelt upon the unusually advantageous manufacturing facilities offered by the city, and said that a mile of new wharf frontage had just been completed on the west side of the harbor. He

said the people were contented and all the several branches of industry represented were in a prosperous and flourishing condition.

In his reply President Robert W. Hunt thanked the Mayor for his gracious welcome and said that probably the best evidence he could give of the interest manifested by engineers in the city of Providence was the fact that the largest meeting of a technical society ever held in the United States and probably in the world was there convened. He referred to Providence as the birthplace of the Corliss engine and the fact that many of the leading engineers of the country had been trained within its walls.

The first paper presented was by R. Van A. Norris, entitled "Two Rope Haulage Systems." This may be misleading, since the paper in fact described

TWO SYSTEMS OF ROPE HAULAGE,

designed by J. H. Bowden, chief engineer of the Susquehanna Coal Company. The first was erected in 1888, and was designed to take the empty mine cars from No. 5 breaker back to No. 4 slope.

The cars are hoisted from the slope in trips of five cars each, and run by gravity to the breaker, where they are hoisted to the top in self-dumping cages, lowered, then bumped off and backswitched on to the empty track. The problem was to transport 600 cars per day up a grade varying from 1½° to 7°, and around a reverse curve for a distance of about 600 feet, while the coal for shaft and slope boilers, about 40 cars per day, was hauled from the breaker across these tracks, so that arrangements had to be made to allow the mine locomotive to run to the breaker on the empty track. On these accounts, and because of the number of switches in use, it was decided to run the rope overhead 10 feet in the air to clear the locomotive. The rope had to be driven from the breaker engine, an 18 x 48 inch plain slide-valve engine, which was found to have ample power to spare. The rope was a ¾-inch diameter steel hemp-center rope, 19 wires to the strand, and was driven by a plain 6-foot sheave, with the groove filled with babbitt metal, an experiment which it was thought would give the rope a grip without the wear on it incident to a V-groove, and as the rope merely took a half turn on the sheave, some such plan was considered necessary. This babbitt lining has proved a complete success, the rope at first cutting it to the shape of the strands, but afterward wearing smooth; it has shown but $\frac{3}{16}$ inch wear in two years of use. Much difficulty was at first experienced in attaching the pulling chain to the rope. The problem was finally solved by cutting the rope in seven pieces, and connecting each piece by two forged cones with a link between, the cones being securely leaded to the rope, and the pulling chains hooked into the links, removed at the slope and sent back on the loaded trips to the breaker. The cars are attached by slipping a ring on the end of the pulling chain over a pin driven into the side bar of the car. Means are provided for instantly stopping the car when necessary.

The other system was intended to carry the cars from breaker No. 6 to the dirt plane, a distance of 600 feet, and to return the cars. The driving arrangement was similar to those of the first system, except that in the large gear wheel a spring hub was inserted, the main wheel being loose on the shaft and provided with lugs which projected into a chambered hub keyed to the driving shaft, three heavy springs, each closing with 2000 pounds, being interposed between the lugs and the hub, allowing a motion of 4 feet on the circumference of the 6-foot diameter rope-driving wheel to take up the shock of starting. The paper describes in detail the many unsatisfactory attempts that were made at first to design a proper guide pulley and the method of attaching and detaching the cars.

DISCUSSION.

In the discussion J. F. Holloway gave an interesting bit of what he chose to call ancient history. He said that the first use of rope for hauling and for the transmission of power was designed by him and used on the slope of a mining company in Maryland. It consisted of an endless wire rope passing several times around drums at each end, power being applied to the upper drum. The cars loaded at the bottom were hauled up by being attached to the rope by means of an eccentric grip, which, of course, grasped tightest at the steepest part of the incline. At the top the cars were run over a small incline which automatically loosened the grip. Each car carried its own grip. The lower drum around which the cable passed was used to drive the pumps draining the mine, so that the rope really performed double service in hauling the cars and transmitting power.

The next paper, by S. P. Watt, of Cincinnati, Ohio, on a belt dynamometer is presented in full elsewhere in this issue, as is also the paper by George I. Alden, of Worcester, Mass., on a new belt-testing machine.

J. T. Henthorn, of Providence, R. I., described a

TEST OF A TRIPLE-EXPANSION ENGINE.

This engine was specially designed and built by the E. P. Allis Company, E. Reynolds, general superintendent, of Milwaukee, Wis., for the Narragansett Electric Lighting Company of Providence, R. I., for which latter the writer's firm (Remington & Henthorn) were the designing engineers. It is of the triple-expansion type, working as a quarter-crank machine. The performance of this engine when on its regular service at the station was made and reported upon to the parties in interest by a board composed of E. D. Leavitt and the writer, and the details of the trial from the official test are herewith presented to the membership as a matter of engineering information.

The engine has cylinders 14 inches, 25 inches and 33 inches diameter, and each 48 inches stroke. The frame of the engines is formed by two forged iron guide-rod bars, each 4½ inches square, which are secured to the lugs on the cylinder and main pillow block. Both guide-rod bars have a heavy support underneath at the center, which in turn is secured to the foundation by anchor bolts. The guides are formed by cast iron V strips bolted on top and bottom of the bars, and can be removed for repairs at pleasure. The high-pressure and intermediate cylinders work tandem on one crank with the high-pressure cylinder astern, and the low-pressure cylinder works upon a second crank set at right angles to that upon the opposite end of the crankshaft. The intermediate and low-pressure cylinders have each two piston rods, each pair of rods passing through its respective crosshead, with the crosshead pin intervening between the ends of the rods. For the one piston rod of the high-pressure cylinder connection is made to the center of the piston of the intermediate cylinder, and is secured thereto by shoulder and nut. The wrought-iron crosshead is what might be termed of the steamboat type, having the pin at the center and each end turned to fit the shoes or slide of the guide rod.

The details of the construction of the cylinders are shown in section on Figs. 1, 2, and 3, where it will be seen that each is steam jacketed by forcing a working barrel or liner into the cylinder proper, and then each jointed end made tight by staking a copper ring into a recess or groove cut equally in width in the end of the liner and cylinder casting. The heads of each cylinder form the casing for the Corliss type of valve, and through which steam and exhaust passages communicate with corresponding steam passages in the cylinder casting. All of the steam valves are doubled ported to admit of a greater port opening with a minimum valve travel. Excepting the surface of the cylinder head forming the steam chest for the valves, they are not steam jacketed.

The receivers, of which there are two, are each made of welded wrought iron tube, 20 inches in diameter, which is enclosed in a similar tube 24 inches in diameter, thus leaving 1⅝ inch space between the outer and inner shell, through which circulates the jacket steam at boiler pressure. The course of this steam through the receivers and jackets of the several cylinders is as follows: Steam is taken from the main steam pipe to the jacket of the second receiver; the drain from this thence goes to the jacket of the first receiver, from this to the high-pressure cylinder jacket; thence to the jacket of the intermediate cylinder, and finally through the jacket of the low-pressure cylinder, from which by means of a pump of short stroke worked by the engine the water of condensation is thus returned to the boilers through the regular channel.

As before stated, the type of the valves is known as the Corliss. These are equipped with a liberating valve gear designed by E. Reynolds, the general superintendent. As in all modern engines of this type, the valves are closed by vacuum pots located level with the engine-room floor. The cut-off mechanism of the high pressure and the intermediate cylinder is actuated by and under the control of a fly-ball governor; when desirable this controlling mechanism may be disconnected from the intermediate cylinder at pleasure and the point of cut-off fixed by hand adjustment for that cylinder and entirely independent of the action of the governor. For the low-pressure cylinder the cut-off is determined at pleasure by hand adjustment only, and is always independent of the action of governor. This arrangement admits of such a nicety of adjustment in each of the cylinders as may be desirable for any load and pressure, while at the same time the engine is perfectly automatic in its accommodation to the variable load always present in work of this character.

Steam is taken from a welded 18-inch pipe which also is the feeder for two other engines, and is ultimately intended for still more. There were no means for separating the moisture from the steam before entering the engine, nor for removing any water of condensation from the steam after leaving one cylinder and before entering the next one. This condition of things was from necessity, as the size of the steam pipe was made to accommodate one-half of the ultimate capacity of the station, and in this particular test was far in excess of any requirements of the engine. This, of couse, caused condensation in the line, notwithstanding that it was covered by a plastic cement, and these circumstances worked together to the detriment of the engine very materially.

The engine exhausts into the condenser through a 26-inch cast-iron pipe, which also is common to all engines of the station. The condensing apparatus is entirely independent of the main engine, and consists of a condenser 9 feet long, 6 feet wide, and 8 feet high, and contains 2496 square feet of cooling surface. These tubes, which are $\frac{5}{16}$ inch and 1¼ inches in diameter, placed one inside of the other, are suspended vertically from brass plates, with their upper ends expanded therein.

The plates for supporting the smaller tubes are some 8 inches above those for the larger or cooling pipes, as per Fig. 4. These tubes are arranged in six sections of 208 pipes in each section, the water of condensation passing downward through the 1¼-inch tubes, thence upward through the small tubes, where it then crosses over low water, and consequently acting as one leg of a syphon. The engine for working the air and circulating pumps is upright, of the Corliss type of valves, closed by vacuum pots, the same as the valve gear of the large engine, and is 12 inches diameter and 16-inch stroke. The cylinder is not steam jacketed, but is well lagged

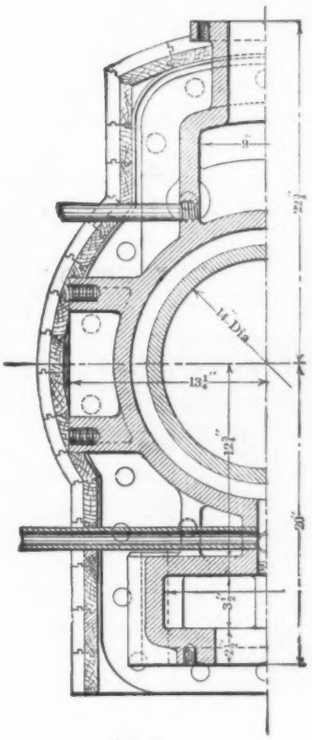


*Fig. 1.*

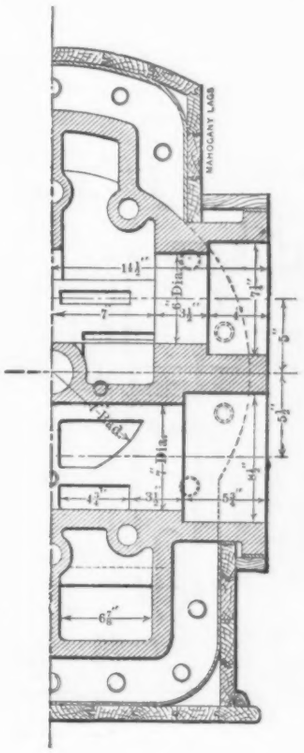


*Fig. 2.*

*Details of Cylinders.*

There are two pumps, of which there is one air pump, 24 inches diameter by 16-inch stroke, of the lifting bucket type without foot valves, and one 16 inches diameter by 16-inch stroke plunger circulating pump. Between the air and circulating pumps is located, on the overhead crankshaft, a plain fly wheel 10 feet in diameter, the center of the shaft being 10 feet 1 inch above the floor. This condensing apparatus is shown on Fig. 4, and is intended to receive the exhaust steam from several engines, as the growth of the station may require, as well as from the one tested.

All oil used in lubricating the working parts of the engine is drained back into an oil well located under each pillow block. From these wells, after passing through a suitable strainer, it is drawn by a small pump, worked by the rocker arm on the high-pressure side, and forced through a system of pipes back again to the working parts. The supply at any one point is controlled by a valve, and so a steady and constant flow of oil is maintained at all places requiring lubrication. This same system is in use on our large engine (1200 horse-power) of the same type and build, and which runs at the same speed, 100 revolutions per minute, with very satisfactory results.

In connection with this paper a general plan of the electric station, where the engines are in daily operation, is given in Fig. 5, which plan shows the location of the engines, boilers, chimneys, &c., and their connections. There is also given a plan and elevation of the engine, Figs. 6 and 7, which plainly show the construction and general arrangement of the parts.

The paper then describes the method pursued in testing the engine, the result being summarized as follows :

| | |
|---|---|
| Revolutions of main engine, total | 59,376 |
| Revolutions of main engine, average per minute | 99.13 |
| Revolutions of condenser engine, average per minute | 61.29 |

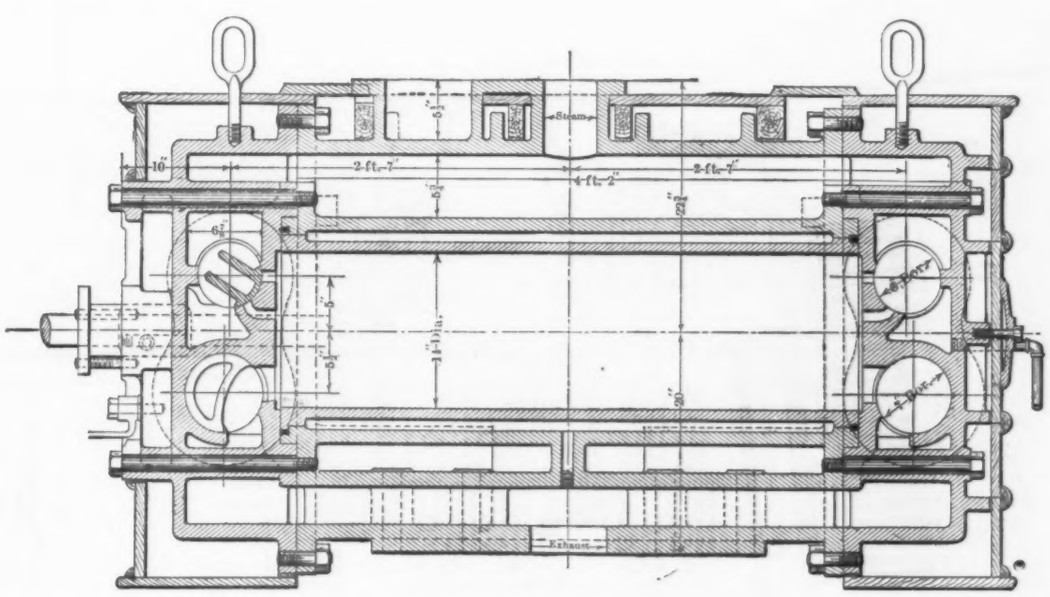


*Fig. 3.—Longitudinal Section through High-Pressure Cylinder.*

## TEST OF TRIPLE-EXPANSION ENGINE.

to the next section, passing down through the small tube and upward between the large and smaller tubes, where it again passes forward, the operation being repeated until the water has traversed six sections, when finally it passes overboard to the river by an 18 inch cast-iron pipe, whose end is submerged about 4 feet below with plastic material and mahogany wood covering. The exhaust steam from this condenser engine passes into the first receiver of the main engine, and is thus again utilized in the intermediate and low-pressure cylinders. This fact of the test precluded the laying out of a combined indicator card from the three cylinders.

| | |
|---|---|
| Steam pressure at engine throttle, per gauge, average | 125.2 lbs. |
| Steam pressure at first receiver, per gauge, average | 26.98 lbs. |
| Steam pressure at second receiver, per gauge, average | 1.70 lbs. |
| Vacuum at condenser, average | 26.5 ins. |
| Barometer, average | 30.08 ins. |
| Temperature of injection water, average | 72.00° F. |

| | |
|---|---|
| Temperature of discharge water, average | 86.06° F. |
| Temperature of hot-well water, average | 109.06° F. |
| Temperature of engine room, average | 90.00° F. |
| Indicated horse-power, main engine, average | 515.70 |
| Indicated horse-power, condenser engine, average | 16.41 |
| Percentage of total steam used in jackets | 14.33 % |
| Water entrained in steam, per calorimeter test | 7.39 % |
| Water entrained in steam, per calorimeter test | 5,497 lbs. |
| Net steam used by engine | 68,840 lbs. |
| Steam per indicated horse-power per hour | 12.94 lbs. |

F. Meriam Wheeler called attention to the fact that in all auxiliary engines in the navy the power required to drive the pump, blower, steering gear, and in fact all auxiliary machinery, rarely constituted 3 per cent. of the total amount. He had noticed that this engine consumed that amount simply for the circulating appa-

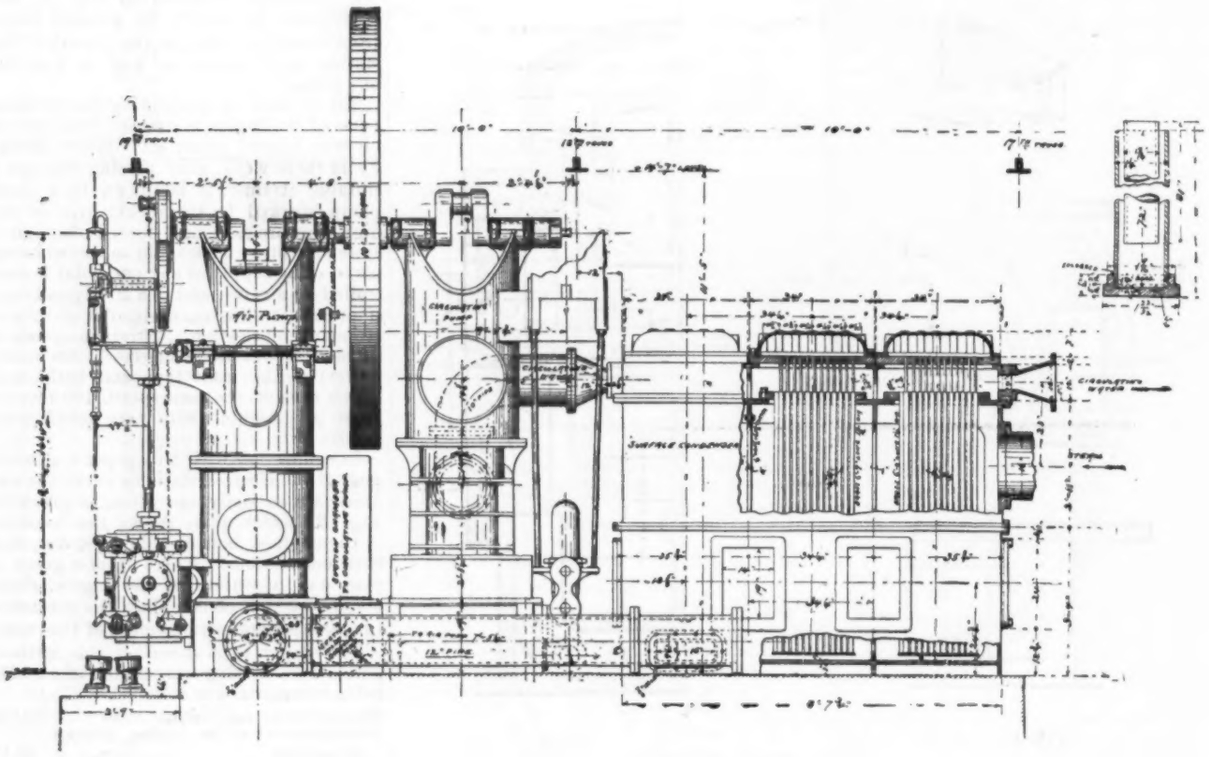

*Fig. 4.—Sectional Elevation of Pumps and Condenser.*

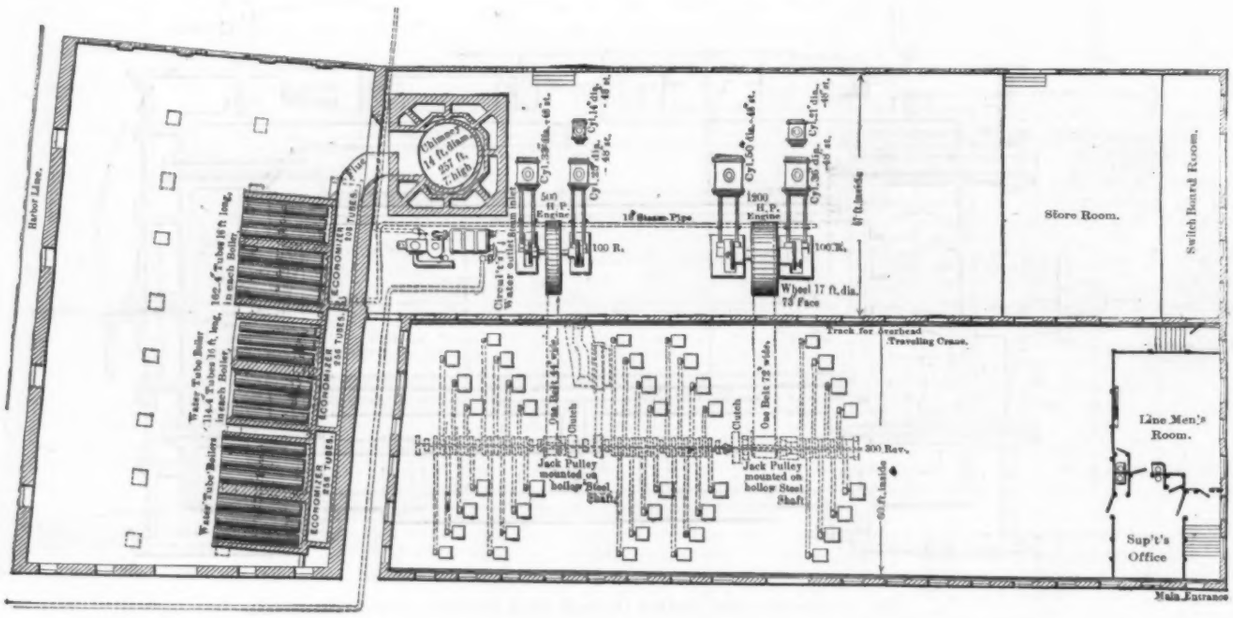
Harbor Line.
Chimney 14 ft. diam. 257 ft. high
Flue
Water Tube Boiler 114-4 Tubes 16 ft. long, in each Boiler
168-4" Tubes 16 ft. long, in each Boiler
ECONOMIZER 216 TUBES
ECONOMIZER 216 TUBES
ECONOMIZER 216 TUBES
Water Tube Boiler
Cyl. 36" dia. - 48" st.
Cyl. 14" dia. - 48" st.
Cyl. 36" dia. - 48" st.
Cyl. 27" dia. - 48" st.
Cyl. 36" dia. - 48" st.
Cyl. 27" dia. - 48" st.
500 H.P. Engine
1900 H.P. Engine
18" Steam Pipe
100 R.
100 E.
Circul'g Water Outlet from Wells
Wheel 17 ft. dia. 12" Face
Store Room.
Switch Board Room.
Track for Overhead Traveling Crane.
One Belt 24" wide.
One Belt 24" wide.
One Belt 72" wide.
Clutch
Clutch
Jack Pulley mounted on hollow Steel Shaft.
Jack Pulley mounted on hollow Steel Shaft.
300 Rev.
60 ft. Inside
Line Men's Room.
Sup't's Office
Main Entrance

*Fig. 5.—Plan of Narragansett Electric Light Company's Station.*

## TEST OF TRIPLE-EXPANSION ENGINE.

| | |
|---|---|
| Indicated horse-power, aggregate, average | 532.11 |
| Water discharged from hot well, total | 63,684 lbs. |
| Water discharged from jackets, total | 10,653 lbs. |
| Water discharged from engine, total | 74,337 lbs. |

### DISCUSSION.

William Kent said that the water carried by the steam produced no serious consequences, except the space occupied by it, and asked if this was not so considered in the test made by Mr. Henthorn.

ratus. He also said that tubes placed horizontally in condensers will do at least 15 per cent. more work than when placed vertically, and that experiments had shown this to be true.

Mr. Henthorn in his reply said that the condensing apparatus of the engine tested

was designed in order to serve a total engine horse-power of 2000; that is, it would be used in connection with a plant having about 2000 total horse-power, and that, therefore, it could not be considered in this particular test of this engine as detrimental, since it required the 3 per cent. power. When the additinal engines had been put in place the expenditure for this engine for its condensing apparatus would then be less than 1 per cent., which was in full accord with the best practice.

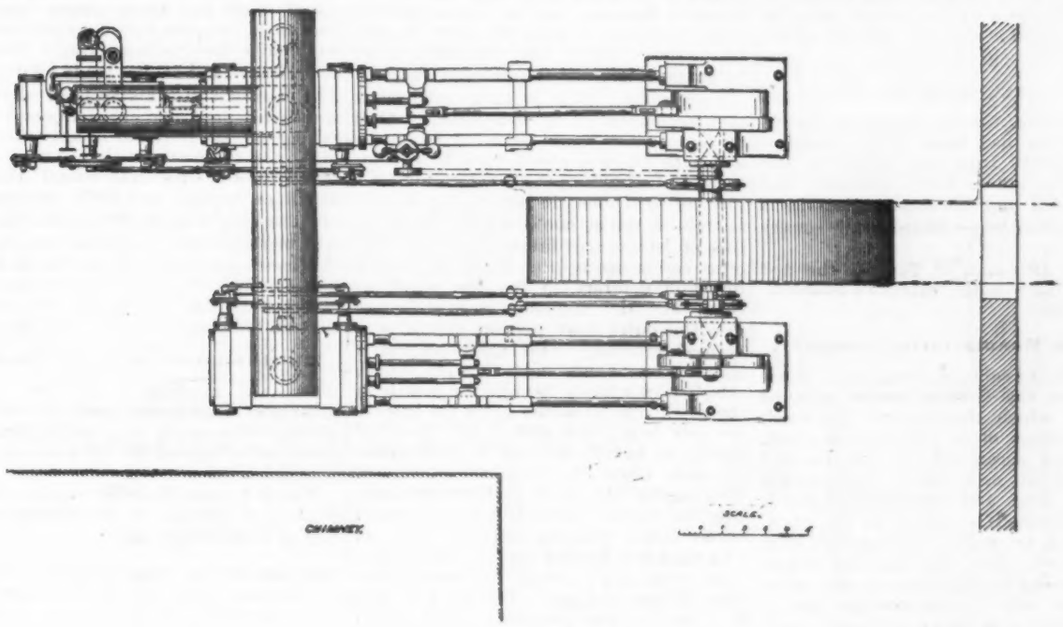

*Fig. 6.—Plan of Engine.*

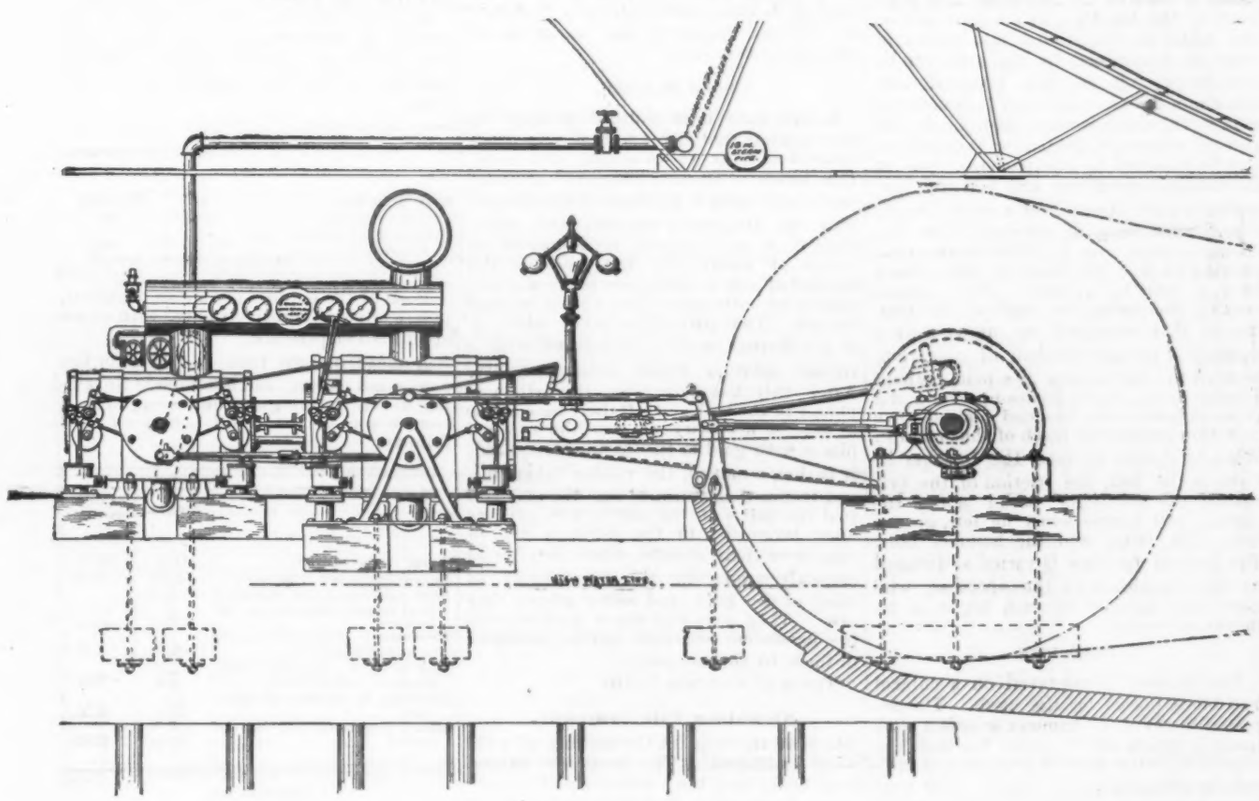

*Fig. 7.—Elevation of Engine.*

## TEST OF TRIPLE-EXPANSION ENGINE.

The committee on

THE STANDARD METHODS OF TESTING MATERIALS

reported that it had been suggested to make the work of an intenational character. They have received invitations from German engineers to convene at the Vienna Exposition in 1892, there to consider the question. The work done so far had been satisfactory, the answers received have been voluminous, and in general the work of the committee was progressing most satisfactorily. It has been discovered that there is a certain relation between the testing of materials which have been differently manipulated and are of different shapes, the operation effecting the materials when put under test. It had, therefore, been considered advisable to consider this point, the presentation of which would require more time. It was also brought out that this committee is not working independently of other American

societies, and its report, therefore, will not clash with anything which may be done by others, thereby avoiding the insinuation that two or more American societies would report on different and widely divergent methods of testing the same material. It is probable that the report of the committee will be in such shape as to be presented at the next meeting of the society, to be held in the fall.

NEW MEMBERS.

The report of the tellers showed that 96 new members had been elected, five had been promoted from the junior to full membership grade, four associates had been elected and 36 juniors, making a total of new members added to the society of 136.

On the afternoon of Tuesday the first point visited was the extensive establishment of the

**Gorham Manufacturing Company,**

situated in the suburbs of the city. Some time since the Gorham people selected this site, which they named Elmwood, for the location of an entirely new plant. They have succeeded in transforming waste land into an attractive spot containing their large and well-arranged buildings, all planned according to the slow combustion principle. The visitors were vastly interested in what they saw in hurriedly passing through these works, as the operations were entirely new to most of them. They were shown silverware, large and small, of plain and most elaborate design, in all stages of its manufacture.

It is not possible to more than briefly glance at some of the operations here practiced in the handling of precious metals. The metal is first rolled into sheets or strips, as determined by the article to be reproduced. It is then stamped out, sometimes drawn, sometimes hammered or spun to the shape wanted, and finally engraved, embossed, gilded or stamped, as may be required by the pattern. One of the simplest operations and yet one conveying a good idea of how a single branch is performed, may be obtained from following a spoon from the sheet to the final packing room. The blank is first struck from a strip by a press. The pattern usually decorating the end of the handle is then stamped on under a drop hammer of peculiar method of operation. Secured to the hammer is a belt, perhaps 2 inches wide, which passes up over a flat grooved pulley, the free end coming down to within convenient reach of the operator. When he desires to raise the hammer he tightens the belt, the friction of the belt against the revolving pulley doing the raising. Of course when he lets go the belt slips freely and the hammer falls. The force of the blow is varied as dictated by the experience of the operator, who raises the hammer to such hight as he thinks necessary.

LEAD DIES

The pattern is engraved on a cubical lead block placed on the anvil. The repeated blows of the hammer as spoon after spoon is struck act to spread the lead, the engraved central portion gradually sinking and the sides rising in ridges The lead block is used until it has been worn nearly through, the pattern remaining clear to the end. After the end has been stamped the handle is then bent under another hammer, which strikes it a light blow. The bowl is then shaped under egg-shaped drop hammers in dies, also of lead. Modifications of this are carried all through the different patterns, although in some cases when the pattern is more elaborate and intricate steel dies under heavier hammers are used. Bowls and the like having contracted openings are first shaped up as far as they will "draw," when the interior is filled with a segmental block, which is then held in a lathe and the lip spun out to the shape desired. Intricate and finely-chased work depends for its success solely upon the skill of the workman. We will suppose the bowl from the spinning lathe is to be engraved in a leaf pattern. The mouth of the bowl is not large enough to admit a hammer, and it therefore becomes necessary to bulge the metal at each leaf and along the heavier stems by striking it from the interior in some other method. This is easily and accurately accomplished by an appliance which at first glance would seem to be crude, and with which it would seem to be impossible to produce any good results. A piece of steel about 18 inches long is bent at right angles at one end and gripped by this projecting part firmly in a vise. The other end is also bent at right angles in a direction contrary to the first bend, so that when the appliance is held in the vise the outer bent portion stands in a vertical position. This outer portion is rounded on its end, and is of such length that it passes freely through the mouth of the bowl. The workman holds the bowl in his left hand, and strikes the steel rod lightly or heavily as may be demanded. At each blow the steel rod rebounds, striking the interior of the bowl and forcing the metal outward. The repeated blows finally bring the surface of the bowl to a condition having all the raised portions necessary in order to carry out the idea of the designer. The bowl is then filled with a wax preparation and passed to engravers, who with small chisels and light spring-handled hammers engrave the design which lies before them in the shape of a plaster pattern. This work is extremely delicate, and in all cases of elaborate designs requiring fine execution is necessarily very slow.

GOLD PLATING.

It will have been noticed perhaps by most readers that silver ware is sometimes covered in spots, so to speak, with gold. The bowls of spoons, interior of ordinary bowls and certain portions of ornamental ware are frequently covered with gold. This, it is well known, is deposited by means of electricity, but perhaps the method of only covering one particular section of an entire piece may not be so well known. That part of the piece which it is not desired to coat is painted with a rubber solution which adheres firmly. After this has been done the article is placed in the bath and left there such a time as may be necessary to coat the exposed places with gold to the thickness required. It is then removed, the rubber taken off, and trimmed and cleaned up. We may add that the ladies of the parties were perhaps more interested in the Gorham exhibit than were their escorts, since they could certainly appreciate the rare beauty of many of the gold and silver pieces they saw. They were also much pleased with the handsome souvenir spoons presented to them by the company.

The next visit was to the

**Nicholson File Company,**

where all the steps in the making of a file were examined. The blank is shaped both blade and tang under small quick-stroke hammers. It is then annealed, all imperfections on the surface are ground off on grindstones, and then brought almost to a polish under pumice. The cutting machines resemble somewhat a very small inclined planer, the bed of which is perhaps inclined at an angle of 30 or 40 degrees to the horizontal. What would be the ordinary tool carriage carries a sharp cutter which is reciprocated with exceeding rapidity. At each downward stroke the cutter strikes the blank and raises the metal to form one tooth. During the upward stroke the file is moved up by the inclined bed the space of one tooth. This in general is the process pursued of cutting files, the machines varying in size and in rapidity of stroke according to the size and nature of the file to be produced. The files are then tempered, straightened and tested by actual filing in order to ascertain the quality of the cutting and by sound, each one being struck upon an iron anvil, in order to find out if there are any cracks due to tempering. They are then cleaned and packed ready for delivery. The files cut by this method showed a wonderful precision in spacing and in the raising of all teeth to exactly the same hight and the perfectly shaped edge of the raised tooth. We understand that the machines require very little attention in order to keep them in order, and that they may be relied upon to produce work from the finest—over 400 cuts to the inch—up to the coarsest files made by this process.

The next place of interest was the ivy-covered buildings of the

**Rhode Island Locomotive Works.**

where the machinery necessary for the making of a locomotive and its tender and all the various parts of an engine, from the rough to the finished pieces, were examined with much interest.

The first paper Tuesday evening was by Prof. D. S. Jacobus of the Stevens Institute of Technology on

COMPARISON OF THE ECONOMY OF COMPOUND AND SINGLE-CYLINDER CORLISS CONDENSING ENGINES, EACH EXPANDING ABOUT SIXTEEN TIMES.

The engines used in obtaining the comparative results are located at Stations I and II of the Pawtucket Water Company.

The tests show that the compound engine is about 30 per cent. more economical than the single-cylinder engine. The dimensions of the two engines are as follows:

| | Single. | Compound. |
|---|---|---|
| Bore in inches | 20 | 15 x 30½ |
| Stroke in inches | 48 | 30 |
| Diameter of piston rod in inches | 3 | 2¾ |

Both of the engines are steam jacketed, practically on the barrels only, with steam at full boiler pressure.

A mean of two tests is taken for the compound engine, and a test made November 4 for the single-cylinder engine. A comparison of the results obtained is as follows:

| | Single. | Compound. |
|---|---|---|
| Total horse-power | 141.5 | 145.9 |
| Revolutions per minute | 71.82 | 49.23 |
| Ratios of expansion with initial steam pressure of 127 pounds | 15½ | 15½ |
| Pressure of steam in pounds above atmosphere | 106.3 | 127.5 |
| Number of degrees that steam is superheated | 5.5 | 3.0 |
| Vacuum in inches of mercury | 27.5 | 27.9 |
| Steam per hour per horse-power | 20.35 | 13.73 |

DISCUSSION.

Professor Peabody, in the discussion, said that comparisons should not be drawn between the performance of these two engines, both having the same number of expansions. Each engine ought to be fitted as best suited to its design and the merits then ascertained. The engines ought to have been tried to the same vacuum, in order to obtain an accurate test. A commercial test is no factor in the problem.

Professor Jacobus said that the aim was to compare a single and compound, both expanding 16⅓ times. The test was no

intended to show a commercial comparison, but to illustrate that with many expansions through two or more cylinders better results could be obtained. The compound came out about 30 per cent. ahead; the main difference he ascribed to the effect of clearance.

Mr. Wheeler called attention to the fact that the economy of the single engine in this case was exceptional, and he doubted if any one present knew of a single engine generating a horse-power with but 20.35 pounds of steam. There were, of course, compounds doing as well as the one tested, as it is not unusual to find them using 15 pounds of steam or less per horse-power.

The next paper was by Prof. De Volson Wood, Stevens Institute of Technology, on the Flexure of Elastic Rings.

We present in the following an abstract of a paper which excited a good deal of discussion, presented by F A. Halsey of Sherbrooke, Canada, entitled,

THE PREMIUM PLAN OF PAYING FOR LABOR.

He divides the paper into four parts, of the first three of which we give an abstract describing in full his premium plan.

1. *The Day's-Work Plan.*—Under this method the workman is paid for and in proportion to the time spent upon his work. The objections to the plan are well known. Analyzed to their final cause, they spring from the fact that any increase of effort by the workman redounds solely to the benefit of the employer, the workman having no share in the consequent increase of production. He has consequently no inducement to exert himself and does not exert himself. Under this system, especially in a manufacturing business, matters naturally settle down to an easy-going pace, in which the workmen have little interest in their work, and the employer pays extravagantly for his product.

2. *The Piece-Work Plan.*—Under this plan the workman is paid for and in proportion to the amount of work done. It is a natural attempt to overcome the objections to the day's-work plan. It has the appearance of being just and of being based upon correct principles. Nevertheless, extended inquiry has convinced the writer that it seldom works smoothly, and never produces the results which it should.

An employer who has become dissatisfied with the results of the day's-work plan, and decides to adopt piece work, usually reasons that work which is costing in wages say $1 per piece, could, with some extra effort, be produced on the existing scale of wages for about 80 cents; and desiring to give the workman some inducement, offers him 90 cents per piece, thereby dividing the expected saving with him. The trouble begins at once. The workman does not believe that he can "make wages" at the rate offered, and objects. He is, however, finally induced or compelled to try it, and immediately proceeds to astonish himself and all others by increasing his output far beyond the expected 25 per cent. His earnings increase with startling rapidity, but the cost of the work remains where set, at 90 cents per piece, and the employer soon finds that instead of a substantially equal division of the savings he is getting but little, and the workman practically all of it. He accordingly proceeds to cut the piece price, and the fatal defect of the system appears. This cut is in appearance and in fact an announcement to the workman that his earnings will not be allowed to exceed a certain amount, and that should he push them above that amount he will be met with another cut. Cutting the piece price is simply killing the goose which lays the golden egg. Nevertheless, the goose must be killed. Without it the employer will continue to pay extravagantly for his work; with it he will stifle the rising ambition of his men. The difficulties of the day's-work and piece-work plans are thus seen to be the exact antithesis of one another. Analyzed to their final cause, the difficulties with the piece-work plan spring from the fact that the piece price once set any increase of effort by the workman redounds to his own benefit alone—the employer having no share in the consequent saving of time. To obtain a share he cuts the piece price, with the consequences stated. . . .

3. *The Profit-Sharing Plan.* — This plan was originally devised in the effort to avoid the objections to the two former plans. Under it, in addition to regular wages, the employees are offered a certain percentage of the final profits of the business. The leading objections to the plan are the following:

(*a.*) The workmen are given a share in what they do not earn. Increased profits may arise from more systematic shop management, decreased expenses of the sales department, or many other causes with which the workmen have nothing to do. Anything given them from such sources becomes simply a gift, the result of which is wholly pernicious—in fact, the entire system savors of patronage and paternalism.

(*b.*) The workmen share, regardless of individual deserts. An active, energetic workman cannot have the same incentive to increased exertion under a system which divides the results of his efforts among a dozen lazy fellows at his side that he would have under one in which his earnings depend on himself alone; on the other hand, a lazy workman would naturally consider it much easier to take his portion of the earnings of his fellows than to exert himself and then divide the results with all the others of the force.

(*c.*) The promised rewards are remote. The incentive cannot be as great under a system which computes and divides the savings once or twice a year as under one which pays out the extra earnings week by week.

(*d.*) The plan makes no provision for bad years. We hear much of profit sharing, but nothing of loss sharing. And yet the workman cannot expect to share the profits while others assume the losses; and, *per contra*, those who assume the risk of loss cannot be expected to share the profits with those who have nothing at stake.

(*e.*) The workmen have no means of knowing if the agreement is carried out. With their exaggerated ideas of the profits of business, the results must be in many cases disappointingly small, and they will doubt the honesty of the division. . .

4. *The Premium Plan.*—Taking up now the subject proper of this paper, it aims at a division of the savings due to increased production between the employer and employee, but by a direct method instead of the circuitous one of the profit-sharing plan. The plan assumes two slightly different forms, according to the nature of the work; one form being suited to work produced in such quantities as to be reducible to a strictly manufacturing basis, and the other form to the more limited production of average practice. In both forms the essential principle is the same, as follows: The time required to do a given piece of work is determined from previous experience, and the workman, in addition to his usual daily wages, is offered a premium for every hour by which he reduces that time on future work, the amount of the premium being less than his rate of wages. Making the hourly premium less than the hourly wages is the foundation stone on which rest all the merits of the system, since by it if an hour is saved on a given product the cost of the work is less and the earnings of the workman are greater than if the hour is not saved, the workman being in effect paid for saving time. Assume a case in detail: Under the old plan a piece of work requires ten hours for its production, and the wages paid is 30 cents per hour. Under the new plan a premium of 15 cents is offered the workman for each hour which he saves over the ten previously required. If the time be reduced successively to five hours the results will be as follows:

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Time consumed. | Wages per piece. | Premium. | Total cost of work. = col. 2 + col. 3. | Workman's earnings per hour = col. 4 ÷ col. 1. |
| Hours. | $ | $ | $ | $ |
| 10 | 3.00 | 0 | 3.00 | .30 |
| 9 | 2.70 | .15 | 2.85 | .317 |
| 8 | 2.40 | .30 | 2 70 | .333 |
| 7 | 2.10 | .45 | 2 55 | .364 |
| 6 | 1.80 | .60 | 2.40 | .40 |
| 5 | 1.50 | .75 | 2.25 | .45 |

This table illustrates the manner in which the cost of the work diminishes and the workman's earnings increase together until, to cite the extreme case of the last line, if the output be doubled, the wages paid per piece will be reduced 25 per cent., but the workman's earnings per hour will be increased 50 per cent. Were the premium less than 15 cents per hour, the reduction in cost for each hour saved would be greater, and the workman's earnings less. On the other hand, the workman would have a smaller incentive, and the time would not be reduced so much. The output would be less, and the net result might be worse for both employer and employee. This raises the inevitable question: What should be the rate of the premium? Nothing but good sense and judgment can decide in any case. In certain classes of work an increase of production is accompanied with a proportionate increase of muscular exertion, and if the work is already laborious a liberal premium will be required to produce results. In other classes of work increased production requires only increased attention to speeds and feeds, with an increase of manual dexterity and an avoidance of lost time. In such cases a more moderate premium will suffice. Any attempt, however, on the part of the employer to be greedy and squeeze the lemon too dry will defeat its own object, since if a trifling premium be offered the workman will not consider it worth while to exert himself for so small a reward, and the expected increase of output will not take place. On the other hand, if the premium offered be too high the employer will simply pay more than necessary for his work, though less than he has been paying. If the rate of premium is decided upon judiciously, it may and should be made permanent. No cutting down of the rate should ever be made unless, indeed, improved processes destroy the significance of the first time base. Every increase of earnings is necessarily accompanied by a corresponding decrease of cost, and if the premium be such as to give these a satisfactory relation the workman may be assured that there will be no limit set to his earnings; that the greater they are the more satisfactory they will be to the employer. The importance of this cannot be too strongly insisted upon. If the premium be cut the workmen will rightly understand it to mean, as under the piece-work plan, that their earnings are not to be permitted to pass a certain limit, and that too much exertion is unsafe. The very purpose of the plan is to avoid this by so dividing the savings between employer and employee as to remove the necessity for cutting the rate, and hence enable the

workman's earnings to be limited only by his own ability and activity. The baneful feature of the piece-work plan is thus completely obviated, and instead of periodical cuts, with their resulting ill-feeling, the premiums lead the workman to greater and greater effort, resulting in a constant increase of output, decrease of cost and increase of earnings.

The broad-minded employer will not fail to recognize that his own gain from the system comes largely from the increased production from a given plant, since not only does the system reduce the wages cost of the piece of work in hand, but in so doing it increases the capacity of the plant for other work to follow. The advantages from this source are so great as to render unnecessary any refined hair splitting as to the rate of the premium.

Such is the premium plan, and the writer confidently predicts that the more it is studied the more perfect will appear its adaptation to the requirements of industrial enterprise and human nature. Surely a system which increases output, decreases cost and increases workman's earnings simultaneously, without friction, and by the silent force of its appeal to every man's desire for a larger income, is worthy of attention. In addition to the commanding features noted it has others of lesser note. The transition to it from the day's-work plan is easy and natural. It does not involve a reorganization of the system of bookkeeping, but only an addition, and a small one, to the existing system. No opposition to it, organized or otherwise, is possible, since there is nothing compulsory about it, and nothing tangible to oppose. It is simply an offer to gratify one of the strongest passions of human nature, and the difficulty often found in introducing piece work cannot occur with this.

In carrying out the plan in connection with work which has been reduced to a manufacturing basis, the writer finds the following form of time ticket convenient:

**TIME TICKET.**

*Name of Part*..... *No of Pieces*.....

*Operation*..... *Workman*.....

HOURS.

| Date. | 7 | 7½ | 8 | 8½ | 9 | 9½ | 10 | 10½ | 11 | 11½ | 12 | 12½ | 1 | 1½ | 2 | 2½ | 3 | 3½ | 4 | 4½ | 5 | 5½ | 6 | Over-time. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | | | | | | |

*Machine set by*..... *Time*.....*hours.*

This ticket is issued by the foreman, the blanks at the top being filled up by him. If desired as a check, he punches a hole on the line indicating the hour when the work is given out, repeating the same when the work and ticket are returned. The record of the time is kept by drawing a line between the various hour marks, an operation which the most illiterate can perform. The ticket provides for several days' work, and is not returned until the work is completed, when it contains the record of the entire job.* On the back of the ticket is printed the following:

"According to previous experience this work should require....hours. If completed in less time than that a premium of....cents will be paid for each hour saved."

When the ticket is returned, a comparison of the back with the front shows the premium earned. This is entered opposite the workman's name, in a book kept for the purpose, which is a companion to the usual time book or pay roll. On pay day the accrued premiums are paid to each workman along with the regular wages. The cost book is written up from the ticket in the usual way, except that as the ticket usually contains the record of several days' work, the labor of keeping the cost book is much abridged.

On work which, while produced as a regular product, is still not produced in sufficient quantity to justify recording the cost of each part, the premium offer is made to the group of men who carry out the work. The proposition is made as a posted notice or otherwise in the following form:

"According to previous experience this work should require....hours. If completed in less time than that a premium of....cents per hour saved will be divided among those working on the machine, division to be in proportion to time spent on the work."

In this form the system loses the advantage of dealing directly with the individual, and the second objection to the profit-sharing plan is introduced, though in a modified degree, as a small group of men is dealt with instead of the entire force. The remaining objections to the profit-sharing plan are not introduced, and on such work the plan proposed is distinctly superior, though lacking theoretical perfection. The piece-work plan does not apply to work of this kind, and hence there can be no comparison between it and the plan under discussion.

On contract work undertaken for the first time the method is the same, except that the premium is based on the estimated time for the execution of the work.

The system is thus applicable to all classes of machine shop work except "jobbing" or work done by the hour; and there is no very vociferous demand from the shops for a method of reducing the time on that class of work.

The writer believes that, judiciously administered, the plan proposed will produce a larger output and cheaper work, and at the same time pay higher wages than any other whatsoever.

DISCUSSION.

John T. Hawkins of Taunton, Mass., thought that the piece-work or hour's-work plan was the only one that would give full satisfaction. He failed to see any surer method, and stated the opinion that the piece-work plan is by far the best yet devised. E. F. C. Davis of Richmond, Va., did not think the premium plan described practicable, and thought the piece-work system much more desirable.

Samuel Webber of Erie, Pa., said that the success of piece work depended upon, first, accurately gauging the prices to be paid and then adhering to them. The main thing was that both the employer and employee should trust each other and deal fairly with one another. The piece-work system is the only one that will ever be a success, and will never be a success unless both factors come amicably together and settle the question.

William Kent said that he regretted that Mr. Halsey had failed to state in his paper anything regarding the actual working of his premium plan. Some three years, upon Mr. Halsey's suggestion, he introduced the plan in the works of the Springer Torsion Balance Company, with results that had been exceedingly gratifying. He thought it was the best yet devised, and that as long as there is to be advancement, as long as increased skill and better machinery are to be brought to bear on the product made, it is by far better than any other, since it provides for such increase in facilities and their increased output. Should the condition ever arise when no progress will be made in either skill or machinery, then the whole question becomes one of extreme simplicity.

James McBride of Brooklyn, N. Y., said that in his works, the New York Dye Wood Extract and Chemical Company, he employed unskilled labor to a large extent. Some two years ago it was decided to give the men a share of the profits, but

* This rule holds, even when the job after being partly finished is interrupted by something more pressing. In such a case the ticket is taken up by the foreman in order to insure that the entries have been made for the completed work. He issues the ticket again when the work is resumed, and when all is completed this ticket goes to the office, where a single entry in the cost book records what, under the usual method, might require a half dozen or even more entries.

no contract whatever to that effect was made with them. The plan had resulted in greatly improving the work of the men and also the character of the men employed. Further than that, both skilled and unskilled labor liked it. In some departments the pay roll had been reduced, since a good man would refuse to work with a poor man. At the end of the first year the laborers were paid 5 per cent. on the amount they had received during the year as their share of the profits. The skilled labor was paid 10 per cent. Next year a discrimination was made, inasmuch as the poor workmen received only 3½ per cent., while the others, those who paid more attention to their business and were more skilled, received amounts varying from 5 to 10 per cent. of the total received by them during the year. The result was that those who only received the smaller amount were laughed at by their fellows, and since then the quality of work produced by them has greatly improved.

Daniel Ashworth of Pittsburgh claimed that employers were largely at fault. There was too much throat cutting in prices, and the whole question would be simpified to a great extent when the workmen decided to send to the employer representatives who would advocate their interests and with whom the employer might talk as man to man.

Mr. Halsey, in reply to the many remarks which had been made, urged that the premium plan was not invented by angels, neither was it intended for a shop conducted by angels, nor a shop manned by angels. The golden rule was a good one, but as long as men have a streak of human nature in them it becomes necessary to take cognizance of that streak and adjust business in conformity with it. He had found in his own experience that piece work was unpopular with the men. He said that while the premium plan would, as had been shown in the trials of all of the other plans which have ever been advocated, be unpopular with the men at first, the fact that at certain periods, pending, of course, upon the conditions that would arise, they would receive $1, $2, $5 or $10 extra, their dislike would naturally and invariably be turned in the opposite direction.

Prof. R. C. Carpenter of Sibley College, Cornell University, presented two papers, one on the "Application of Hirn's Analysis to Engine Testing, and a Method of Measuring Directly the Quality of the Steam in the Clearance Spaces," and the other on "Notes Regarding Calorimeters." In the former the analysis is reduced to a form readily applicable to ordinary testing, and a large class of students have made an application to a simple condensing engine with plain slide valve and throttling governor. In addition, other tests with applications of this analysis have been made to an automatic engine and to a triple-expansion engine.

During the tests on the plain slide valve engine an attempt was made, with a fair degree of success, to measure the quality of the steam remaining in the clearance space during compression, and a description of this method constitutes the latter and more important part of this paper.

The paper presents the methods used and the results obtained in those tests and discussions relating to the quality of steam by various authors.

The other paper by Professor Carpenter contains a discussion of some experiments regarding the best methods of obtaining steam for calorimetric use, a proposed general classification of calorimeters, and a general discussion of some of the various classes, also a short description of one or two new forms of calorimeters; but the principal portion of the paper is devoted to the throttling calorimeter and some rapid methods of reducing the determinations, for which purpose some diagrams and tables are given.

Prof C. H. Peabody of the Massachusetts Institute of Technology considered the "Application of Hirn's Analysis to Multiple Expansion Engines." Although the application of this theory to simple engines is familiar to engineers, the author has been unable to find a clear and correct statement of the analysis for compound and multiple-expansion engines. The latter application of the theory is considered in the paper.

### JET PROPULSION

was the subject selected by Prof. J. Burkitt Webb of Stevens Institute of Technology. This question is one of unusual interest at the present time, because of the experiments now being made on a practical scale by Dr. Walter Jackson of this city, in his boat Evolution, which is fitted to be propelled by a jet of water issuing, with great velocity, from a small orifice in the stern.

Professor Webb states that a year or two since several students took special interest in the mechanical principles involved in the subject. The law was laid down and enforced by illustration and argument, "but it so happens that these principles, like many other good ones, are unacceptable to the unregenerate mind. When, therefore, I learned that some had gone away and quietly tried the thing, I experienced one of those moments of satisfaction which come to every successful laborer in a good cause; I was glad that nature had had the chance to vindicate her own laws. The subject is not one which is, ordinarily, well understood; in fact, many engineers are totally wrong in their conception of the way in which a jet acts, and it will be a satisfaction to me if this letter contributes toward a more correct knowledge of the facts."

The main part of the paper is found in a letter from Chas. J. Everett, Jr., who describes some experiments he had made with a jet. We quote as follows:

"These trials were made to disprove a statement that a stream of water issuing from a nozzle under water reacts upon the surrounding water and tends to drive the nozzle in the opposite direction to that of the jet, in the same way that a solid rod, issuing from the same nozzle, would react upon a stone wall. The tests were made in a large tank and the water was supplied by a steam pump at a constant pressure of 100 pounds per square inch. The nozzle was fastened to the foot of a pendulum 4 feet long and connected to the pump by a flexible ¼-inch rubber hose. The hose was hung by strings so that the stiffness was inappreciable. The pendulum at the nozzle was connected to a spring balance by a cord about 4 feet long. When the jet was flowing the pendulum was brought to the vertical by moving the balance and in this way every force due to the deflection of the pendulum was eliminated. The pendulum was first hung so that the nozzle was a little above the water and the reaction found to be 4 pounds. The pendulum was then lowered so that the nozzle was about 4 inches below the surface of the water, all other conditions being the same, and the reaction was found to be the same—4 pounds. The only difference was that when the nozzle was under water the balance hand vibrated a little more.

"When these results were reported to the party making the statement, the rejoinder was made that 'the reason was that the jet struck the opposite side of the tank'—5 feet distant—'and so pushed back on the nozzle.' I therefore measured the reaction in air again with the pendulum hung from the roof of the house, 25 feet above the ground, so that the jet broke into spray before it struck. All the conditions were the same as before and the reaction was the same—4 pounds. I then put a flat plate on the pendulum and let the jet impinge upon it, and the pull was the same as the reaction—4 pounds. I afterward used a similar apparatus (but more delicate) with a constant head of water—about 10 pounds per square inch—from an elevated tank. The only difference from the first trial was that the pendulum was held in a vertical position by a delicate spring balance when the jet discharged in the air, and then nothing was altered, but the water allowed to rise in the tank until the nozzle was 2 inches below the surface, and the balance reading remained absolutely the same."

### DISCUSSION.

Mr. Wheeler claimed that this idea of jet propulsion could not be applied practically because both pump and boiler would be of too great a size and the piston speed would be altogether too slow.

Professor Webb, in answer to the various questions which had been put by several members, held that the poorest effect of the jet, or in other words, the least power developed in propelling the boat, would be when the jet was discharged into the water, since it would thereby create a flow in the water itself and of course friction, consuming power, would be the result. A better effect would be obtained when the jet was discharged in air above the water, and the best effect would be obtained if the jet could be discharged in a vacuum, since there would be no resistence. Practically it makes but little difference what the discharge is in. A board brought up close to the jet, provided that its distance from the jet is equal to or more than the area of the jet, produces no effect. The most efficient propeller would be one placed in a parallel tube, since the power then required in generating the radial velocity of the water would be overcome. The professor said that the jet would "kick," no matter what you fired it at.

During the recent chase of the Itata by the Charleston the thought came to him that if both boats were of the same speed precisely, and that if the Charleston were to fire from her bow guns at the Itata and the latter from her stern guns at the Charleston, the Charleston would never catch her, simply because the recoil or kick in one case would act to impede the vessel, while in the other case it would increase her speed. The discharge of a gun on the Charleston would tend to propel her backward and on the Itata would be to increase the speed she already had.

One of the topical queries which now came up for discussion was:

How Many Times per Minute can a Dash Pot Apparatus be Lifted, Such as is Used with the Corliss Valve Gear?

Samuel Webber reported that at the Trenton Iron Works there was a Corliss valve gear making 160 revolutions per minute. William Kent asked the question (which was not answered), if such is the case, why do the Corliss engine builders keep their speed down so low? The next topical question was?

Which is Better Economy in a Foundry Cupola, to Melt Rapidly, Producing Relatively Cool Iron, or to Melt More Slowly, Producing Hotter Iron?

Mr. Webber instanced a case that from May to December, 1890, 100 tons of casting a week, or 8 tons per hour, were obtained from a 60-inch cupola. The ratio of iron to fuel was 7½, and they obtained in casting 75 per cent. of the iron put in the cupola. It was desired to increase the capacity, and from January to May 29 of this year 11½ tons had been obtained per hour. The ratio of iron to pounds of fuel used was 9½ to 1. The loss of efficiency was only ¼ to 1 per cent. It made a difference in labor of about $3 per ton, due direct to the saving of manual labor when the cupola was run quicker.

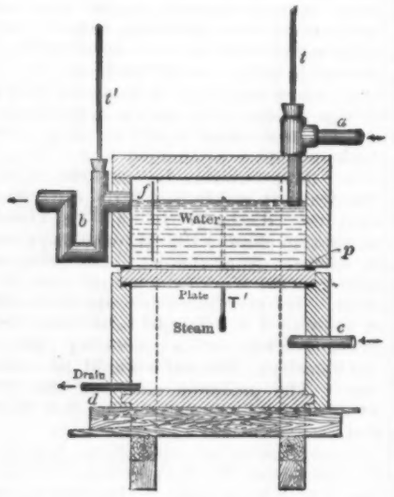
The increased ratio was obtained by using a stronger blast, 14 ounces, and putting in another row of tuyeres. Mr. Henning then described the Herbertz cupola, making such drawings as were necessary on the blackboard and explaining all the good features it possessed. This cupola was described in *The Iron Age* of last week, and it is not therefore necessary to give the remarks of Mr. Henning.

Professor Webb's second paper was on the "Performance of a Steam Reaction Wheel."

Daniel Royse of Ithaca, N. Y., considered the question of

HEAT TRANSMISSION THROUGH CAST-IRON PLATES PICKLED IN ACIDS.

The writer recently made some experiments upon plates pickled in dilute nitric, hydrochloric and sulphuric acids. The calorimeter used in making the comparisons is shown in section in the accompanying illustration. The lower part




*Calorimeter.*

is a pine box 4.5 x 7.5 inches and 4.5 inches deep, inside measurements, the plate through which the heat is to be transmitted forming the top. The upper portion consists of a frame or bottomless box 4.5 x 7 5 inches inside and 3¾ inches deep, which is placed above the plate and covered with a lid, as shown.

The lower compartment is supplied with steam through a ¼-inch pipe, *c*, and is drained through the pipe *d*. In one side a thermometer, T', is inserted, making an angle of 45° with the vertical, so that the bulb is near the center of the box. Above the plate water enters through a pipe, *a*, placed in the lid, its temperature being taken by the thermometer *t*, and flows over the plate and out at the pipe *b*, the thermometer *t* registering the temperature at which it leaves ; *f* is a tin baffle plate.

The method pursued was to turn on the steam and water, and after the temperatures as indicated by the thermometers became constant note the time and weigh the water which flowed through in half an hour, reading the three thermometers at intervals of a minute. Owing to an imperfect mixing of the water the temperature of the outflow was not absolutely constant, the maximum variation being about 2° F.

Experiments were made upon 19 plates, 10 of which were rough and 9 planed on both sides. The minimum of heat transmitted was reached in these cases after about 20 days' immersion in a 5 or 10 per cent solution, when nitric acid was the attacking agent; with the other two acids nearly the same result was achieved with a 5 per cent. solution and 15 days' immersion as with a 5 per cent. nitric acid solution and 10 days' immersion. When both sides of the plates were varnished it is shown that, on an average, but 33 per cent. as much heat was transmitted as when the plate was untreated. The reduction was practically the same with planed as with rough plates, but it was found that the varnish adhered much better to the rough plates, and especially if they had been pickled before applying the varnish.

The paper concludes with the following paragraph: "It is expected that when, as is now proposed, this treatment is applied to the surfaces bounding the clearance spaces of a steam cylinder, the extent to which the iron so treated will store and restore heat, introduced into the engine by the steam, will be diminished about 40 per cent., and thus some practically useful reduction of the internal wastes will be effected. In the engine the varnish is relied upon to retard this interchange of heat, and the alteration of surface produced by the action of the acid is expected to render the varnish more adhesive and permanent."

Prof. R. H. Thurston of Cornell University dealt with "Steam-Engine Efficiencies,—the Ideal Engine Compared with the Real Engine."

The paper by W. W. Bird of Cambridgeport, Mass., on the

EFFECT OF THE STEAM JACKET ON CYLINDER CONDENSATION,

describes some experiments made on an upright single-acting compound engine, 5¼ and 9 inch cylinders by 8-inch stroke, built for the mechanical engineering department of the Worcester Polytechnic Institute. The writer says :

"Judging from the work done thus far, we conclude that for this engine the steam jacket is a benefit, the steam saved more than making up for that used in the jacket directly. The surfaces of the cylinder are warmer when the jacket is used, thus decreasing condensation to begin with ; the steam is dryer at the beginning of exhaust, so that less heat is given up during that period. The steam is not probably homogeneous in the cylinder ; the condensation takes place where it is in contact with the surfaces, forming a film of moist steam which takes up the heat returned after reevaporation begins, and the more moisture in the steam the more heat there is taken from the surfaces. And since most of the heat is returned during exhaust, the condition of the steam at the beginning of that period is of great importance is determining the amount of heat to go out and the efficiency of the engine."

This engine showed a gain of 14.6 per cent. due to jacketing.

Prof. W. A. Rogers of Colby University read a paper describing a "Method of Dividing an Index Plate into 1000 Equal Parts" (which we publish in full elsewhere) and one on "A Machine for cutting Perfect Screws."

The papers by H. L. Gantt on Steel Castings and H. M. Howe on Manganese Steel are also presented in full in this issue.

During the afternoon of Wednesday the society visited the works of

**The Harris Steam Engine Company,**

where they examined the various processes there pursued and admired the appliances. Here they found an immense pulley lathe engaged in turning a pulley 28 feet in diameter. Bolted to the spokes of the pulley was a gear, meshing with which was a pinion driving the pulley, the tool post passing in the usual way across the face. They also saw parts of several engines of different sizes now being erected by the company. Stepping next door they entered the works of the

**Brown & Sharpe Mfg. Company,**

where they had the opportunity of seeing milling-machine practice and the use of grinding machines carried on more extensively as far as variety and range of work are concerned than probably in any other shop in the United States. The first machine to which their attention was especially called was a two-column milling machine engaged in cutting bed plates having four Λ's. The cutter was formed of six separate cutters mounted on an arbor so as to give the requisite form to the bed. This machine cut about four times faster than this work could be done ordinarily. Here the bed was finished with the exception of taking a true cut on a planer. They also saw a new milling machine which was cutting cast iron 7 inches wide to a depth of ¼ inch, the speed being $\frac{1}{12}$ inch to every revolution of the spindle. They also saw handles of several shapes turned from the solid bar at one operation, the cutter, of course, conforming to the contour of the handle to be made. Also the same idea carried out in gear blanks up to 2¼ inches in diameter, the bar being fed through the spindle to the machine. Automatic screw machines of new design requiring no attention whatever were also inspected.

ONE-ONE HUNDRED THOUSANDTH AND ONE-FIFTY THOUSANDTH OF AN INCH.

One of the most interesting departments in the Brown & Sharpe establishment we found in their testing room, where all their own gauges are tested before being placed on the market. It was here that we found accuracy in measurement carried to the extreme and what we might term the factor of error reduced to a minimum. As this branch is but little known outside, and as it is expected here to find more care and more refinement practiced in the testing of their own gauges and measures, which are to be the standards for other shops, we spent most of the time at our disposal in finding out how these final tests were made. In this our attention was confined solely to plug and ring gauges.

Mounted on a bench in front of the window in the testing room was a machine closely resembling a small lathe. The headstock portion was considerably elongated and on it was a scale 8 inches long, graduated on the front edge with coarse marks 40 to the inch and on the rear edge with the same number of exceedingly fine marks which could not be perceived with the naked eye except the light was exactly right. This part of the machine was moved by means of a wheel and screw, and was only intended for coarse measurements.

Mounted so as to bring the fine scale within the field of vision was a microscope. Now, what we might call the tailstock of the machine consisted of a spindle whose axis was in line with the axis of the spindle on the headstock and which could be moved to and from the opposite spindle by means of a wheel similar to the wheel on the tailstock of a lathe. Near this wheel was a wheel graduated on its face, and over which was a vernier graduated so that ten of its lines equalled nine lines on the wheel. A movement of one space on the wheel meant that the tailstock was advanced or withdrawn a distance equal to $\frac{1}{10000}$ inch. Any other movement less than this would be indicated by the vernier, and would vary according to the lines coinciding between $\frac{1}{10000}$ and $\frac{1}{100000}$ inch. A magnifying glass was placed in focus over the vernier scale, so as to facilitate the reading.

With this machine all the final measurements are made, the variation for error allowed being $\frac{1}{10000}$, which in the case of a plug must be in excess and in the case of a ring must be less than the diameter called

for, this being done in order to allow for wear. The machine is provided with an attachment by means of which inside measurements can be made with the same degree of accuracy. The case we saw tested was a ½-inch plug. The headstock spindle was set by means of the microscope on the ½-inch mark. If now the plug were exactly ½ inch in diameter it would be grasped quite firmly between the two centers. If precisely ½ inch in diameter the wheel and vernier would coincide and mark zero. If in excess or if too small there would be a variation to be read on the wheel.

The question was asked Mr. Davis, who has charge of this department, how far the personal equation was taken into consideration in this close measurement. To illustrate how far it was necessary to consider this question, he said that he would show the difference between $\frac{1}{100000}$ inch and $\frac{1}{50000}$ inch, and how appreciable this difference was. This he did by placing a plug between the centers so that the grip was firm, although the plug could with a little effort be turned in the centers. The tail spindle was then withdrawn $\frac{1}{50000}$ inch, and the ease with which the plug could then be turned, was surprising, the friction due to the grip having been almost entirely overcome. This showed conclusively that the individual or the personal equation of the one making the test was not of such serious importance as might at first be supposed.

All spindles intended to receive arbors made by Brown & Sharpe and all arbor shanks are tapered at the rate of ½ inch to the foot. The method of testing the taper on the plugs which are used for testing the holes is exceedingly simple. Two straightedges which can be adjusted at any inclination with each other are mounted on a spindle and placed at such an angle as to give a taper of ½ inch to the foot. The plug is then placed between these straightedges, and if the light disappears at all points at precisely the same time as the plug is moved in, it is taken for granted that the plug is straight and of the correct taper. In experimenting with this device it was found that a plug could be moved up so that daylight could barely be seen between its upper edge and the upper straightedge, and then of a sudden the light would be extinguished seemingly at one point; but when examined along the line it was found that at no point did daylight come through. In regard to temperature, no attempt is made to produce a certain standard at a certain temperature. In testing, the only thing that is carefully considered is to have the piece that is to be tested and the machine both of the same temperature. The idea that it is necessary to bring both machine and specimen to 62° is not practiced, and in this kind of work is considered useless.

**The Armington & Sims Engine Co.**

had prepared a very attractive exhibit. In their testing room they had seven engines of different types under steam. These were as follows: One 200 horse-power, making 200 revolutions per minute; space occupied, 15 x 8 feet; weight, 30,000 pounds; one 35 horse-power, making 300 revolutions per minute; space occupied, 7 feet 9 inches by 4 feet; weight 1500 pounds; another, 135 horse-power, 260 revolutions; space, 11 feet 7 inches by 5 feet 10 inches; weight, 15,000 pounds; next, 90 horse-power, 275 revolutions; space, 9 x 5 feet; weight, 9300 pounds. All of these engines were horizontal. In the other room of their testing department they had vertical engines, one being a 275 horse-power to make 325 revolutions and to couple direct to a Thomson-Houston dynamo, the space over all, including the dynamo, being 16½ x 7 feet. They are now building similar engines of 425 horse-power to make 300 revolutions. The next was a vertical compound of 200 horse-power, 325 revolutions, to drive four Thomson-Houston dynamos, with Evans friction, the space including the dynamo being 16 x 8½ feet. This is the first engine of an order for 26, and another was a double vertical, not compound, 30 horse-power, making 400 revolutions, and intended for ship lighting, to couple direct to a Thomson-Houston dynamo. Of this style of engine the Navy Department has had over 30. All engines made by Armington & Sims are tested under steam, and are kept in their testing room until the engine in every particular meets the requirements experience has shown it should. Every part is thoroughly examined during the test, and at its completion the engine is dismantled and the parts examined in detail. Much of the machinery in this establishment has been selected especially to meet the requirements, and may therefore be considered as best applicable to the work produced.

Prof. J. E. Denton of Stevens Institute of Technology described the performance of a

WORTHINGTON HIGH-DUTY PUMPING ENGINE.

The pumping engine under notice is a 1,500,000 gallon, pumping against a head of 2000 feet of water, in use for pumping crude petroleum over one of the eleven 30-mile sections of the Standard Oil Pipe Line connecting New York City with Olean, Pa.

It is located in a valley of the Allegheny Mountains at Swartout, about 4 miles from Port Jervis, N. Y. The general features of such a pumping station are a boiler and engine house, a telegraph office and two receiving tanks nearly 100 feet in diameter and 30 feet in hight. Oil is supplied to the tanks from another station 30 miles westward by 6 inch pipes running across the country a few feet beneath the surface of the ground. A telegraph operator belonging to each station measures the depth of oil in the tanks every hour of the day and night, and reports the result throughout the line, so that the utmost system prevails, and every station is under perfect control from the headquarters. At night sufficient light is thrown upon the tape to enable it to be accurately read by means of a reflector mounted upon a tower situated midway between the tanks, and at such a distance that all danger from fire is avoided. The pump tested represents the first application of the high-duty attachment to the pipe-line service. This service is very severe, inasmuch as the pressure which the pump must exert often amounts to upward of 900 pounds per square inch, and the work is continuous throughout the day and night.

The paper then describes the method of making the test and ends with the following conclusions :

1. The boiler economy of the station is equivalent to 9.1 and 9.8 pounds evaporation per pound of pea and stove anthracite respectively, from the actual temperature of feed, 147° F., and average steam pressure of 90 pounds above the atmosphere. It is probable that an evaporation greater than 10 pounds of coal, under working conditions, could easily be obtained with the best bituminous coal.

2. The average economy of the engine is represented by either of the following statements:

(*a*) The steam consumed per hour per horse-power, pump end, is..... 17.0 lbs.
(*b*) The steam consumed per hour per horse-power, steam end, is..... 16.4 lbs.
(*c*) The duty per 100 lbs. of coal, if the boiler supplies to the engine 10 lbs. of steam per pound of coal burned, is..... 116.5 mils. ft. lbs.
(*d*) The duty, per each million thermal units of heat imparted to the feed water by the boilers neglecting steam used by feed pumps, is 109.5 mils. ft. lbs.
(*e*) Ditto, including steam used by pump, if latter exhausts into feed water..... 109.3 mils. ft. lbs.

3. The engine works smoothly while pumping against upward of 900 pounds pressure per square inch. Under fluctuations of steam pressure amounting to 5 per cent., and of oil pressure amounting to 10 per cent., the engine maintains an average length of stroke within $\frac{3}{32}$ inch of a maximum possible stroke of 37.85 inches, or within 0.33 per cent. The greatest variation of individual strokes was $\frac{3}{32}$ inch, or 1.0 per cent.

4. The steam condensed in the jackets and reheater in per cent. of the total steam supplied to engine is 15.8 per cent.

5. The power wasted in friction of the mechanism, and operating the two air pumps, in per cent. of the horse-power of the steam end, is 3.6 per cent.

6. The actual delivery of oil was within 1.36 per cent. of the cubical displacement of the pump plungers, or the "slip" was 1.36 per cent.

7. Without the use of steam in the jackets and reheater, water accumulates in the steam cylinders, in an hour's time, to such an extent as to be heard to splash against the pistons, while the loss of mean effective power, principally in the low cylinders, causes at least 10 per cent. loss of speed, which is probably attended with a considerable loss of economy, but to what extent was not determined. The use of steam jackets is undoubtedly necessary to the successful operation of a steam engine of this particular type.

A BLAST-FURNACE BLOWING ENGINE

was described by Fred. W. Gordon of the firm of Gordon, Strobel & Laureau, Limited, of Philadelphia. As this engine was described and illustrated in *The Iron Age* of February 26, 1891, it is not necessary to reproduce the paper.

DISCUSSION.

Mr. Kent condemned most emphatically the valve motion here described. He said that the general idea that economy was not the factor entering into the blowing-engine problem, since steam cost nothing, was an erroneous one, and that it had most essentially impaired the development of the engine. The blast furnace should have the rolling mill beside it so that steam could be supplied to its engine. He said that he might be biased, because he was interested in a better engine, some time since having obtained patents on a compound blowing engine. Engines of this description had been in use in England for a long period, and he saw no reason why they should not be introduced in this country. He further said that if anybody would undertake the building of a compound engine he would be most pleased to grant them full shop right as far as his patents were concerned.

Mr. Holloway defended the modern blowing engine. He said that in the early engine there was a long stroke and a big cylinder. The short quick-stroke engine has done much for blast-furnace practice, since it eliminates the time of getting the piston from one end of the cylinder to the other. At the beginning of the stroke in the ordinary blowing engine there is no resistance in the air cylinder, and yet there is a maximum steam pressure in the steam cylinder. At the end of the stroke there

is the greatest resistance in the air cylinder and the smallest power in the steam cylinder to overcome it. Therefore, the fly wheel has to come in as a compensating device and distribute the energy exerted at different parts of the stroke. This fact makes great weight necessary. Mr. Holloway said in conclusion: "I will now stop, because there are probably many other blowers in the congregation."

John F. Wilcox of the Pittsburgh Iron and Steel Engineering Company remarked that his firm now had on the floor a compound blowing engine, and that he should be pleased to receive from Mr. Kent all documents necesary to grant him a full shop right, as far as his patents were concerned.

Mr. Gordon, in closing, asserted that the blowing engine was made not to make air, but to make iron. Sometimes it had to do its work against 20 pounds of pressure, although ordinarily it was only about 5 pounds. This makes a great variation. The clearances were as close as possible. The valve gear was simple, but, perhaps, not as economical as the Corliss gear so well known in Providence. He did not see the necessity of introducing the more costly and complicated positive motion valves.

James McBride of the New York Dye Wood Extract and Chemical Company of Brooklyn described some

EXPERIMENTS WITH A SCREW BOLT.

He found with an ordinary 2-inch screw bolt which was loaded at one end by a dead weight of 7500 pounds, and to the nut of which a wrench was applied, that 89.81 per cent. of the power applied to the wrench was absorbed by the friction of the nut on the washer and on the threads of the bolt, the percentage of the power applied that was utilized in lifting the load being only 10.19.

MECHANICAL STOKERS

was the title of a paper by W. R. Roney, mechanical engineer of Westinghouse, Church, Kerr & Co. of Chicago. The writer first gave a history of mechanical stokers, showing the many attempts that had been made to do away with the objectionable manual labor. The last portion of his paper was confined to the Roney mechanical stoker, a simple apparatus, which, when attached to steam boilers, receives the fuel in bulk, and thereafter, without further handling, feeds it continuously, and at any desired rate, to the furnace; burns the combustible portion, and deposits the ash and cinder in the ash pit, ready for removal.

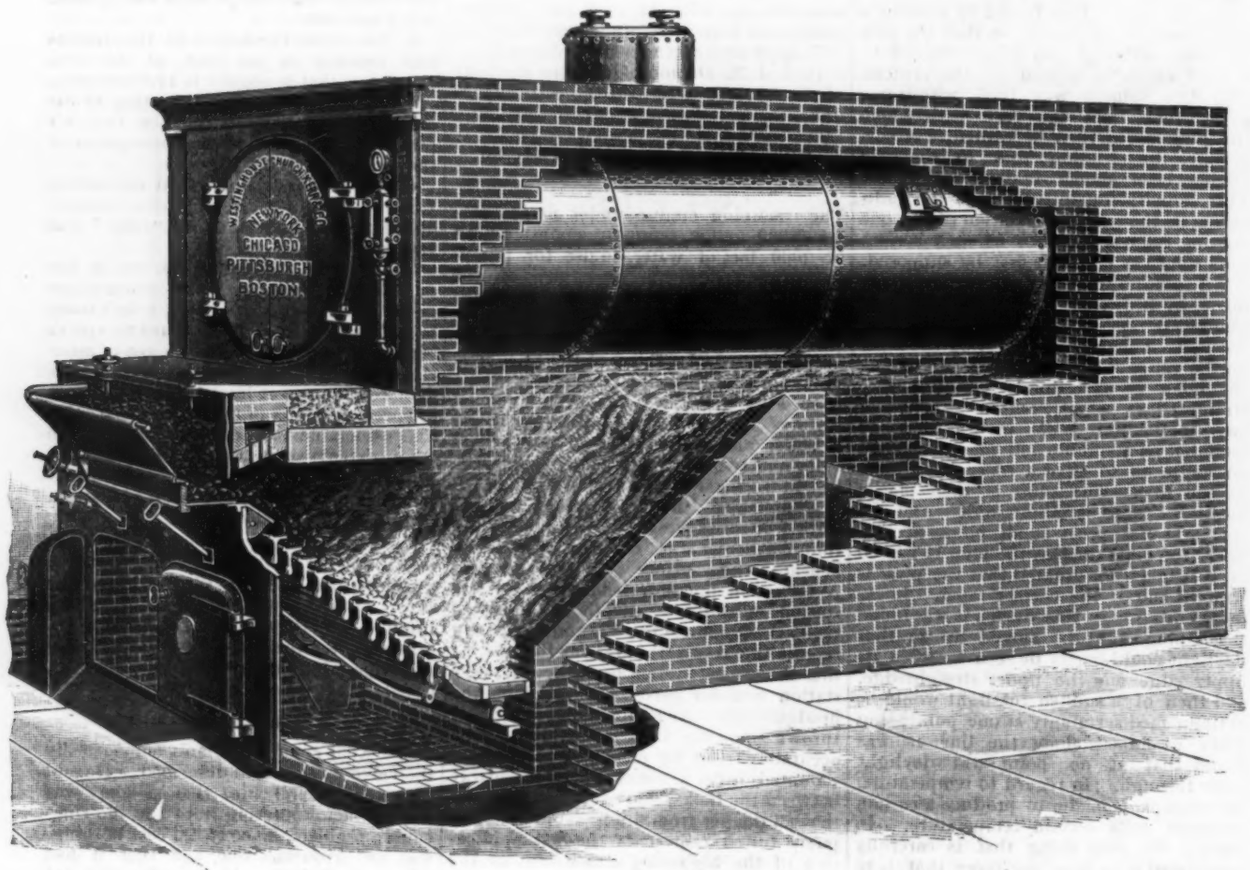



*Fig.* 1.

PERSPECTIVE VIEW OF THE RONEY MECHANICAL STOKER.

The fuel to be burned is dumped into a hopper on the boiler front. In small plants it may be shoveled in by hand. In large plants it is usually handled direct from the car to the hopper by elevators and conveyors. Set in the lower part of the hopper is a "pusher" (see Figs. 2 and 3), to which is attached, by a flexible connection, the "feed plate" forming the bottom of the hopper. The "pusher," by a vibratory motion, carrying with it the "feed plate," gradually forces the fuel over the "dead plate" and on the grate. The grate consists of horizontal flat-surfaced bars, reaching from side to side of the furnace, carried on inclined side bearers, extending from the throat of the hopper to the rear and bottom of the ash pit. The grate bars, therefore, in their normal condition form a series of steps, to the top step of which coal is fed from the "dead plate." These steps at the inclination given would, however, prevent the free descent of the coal. But each bar rests in a concave seat in the bearer, and is capable of a rocking motion through an adjustable angle. All the grate-bars are coupled together by a "rocker bar," the notches of which engage with a lug on the lower rib of each grate bar, pin connections being made with two of the grate bars only, for the purpose of holding the "rocker bar" in position. A variable back and forth motion being given to the "rocker bar," through a connecting rod, by a device hereafter described, the grate bars necessarily rock in unison, now forming a series of steps Fig. 3, and now approximating to an inclined plane. with the grates partly overlapping like shingles on a roof, Fig. 2.

This variable, shutter-like movement furnishes a simple means of regulating the quantity of air passing through the grate, according to the amount of coal to be burned to supply the demand for steam. The depending webs of the grate bars are perforated with longitudinal slots, so placed that the condition of the fire can be easily seen at all times, and free acess had to all parts of the grate to assist, when necessary, the removal of clinker, thus avoiding all opening of doors into the furnace. These slots also serve an important purpose in furnishing an abundant supply of air for combustion. The sectional perspective cut, Fig. 1, illustrates clearly the form of the grate and the advantages of this construction.

Assuming the grate to be covered by a bed of coal, and fresh fuel being fed in at the top, it is obvious that when the grate bars rock forward the fire will tend to work down in a body. But before the coal can move too far the bars rock back

to the stepped position, checking the downward motion, breaking up the cake thoroughly over the whole surface and admitting a free volume of air through and broken up from underneath, and finally lands the cinder and ash on the "dumping grate" below. By releasing the "dumping rod" the "dumping grate"

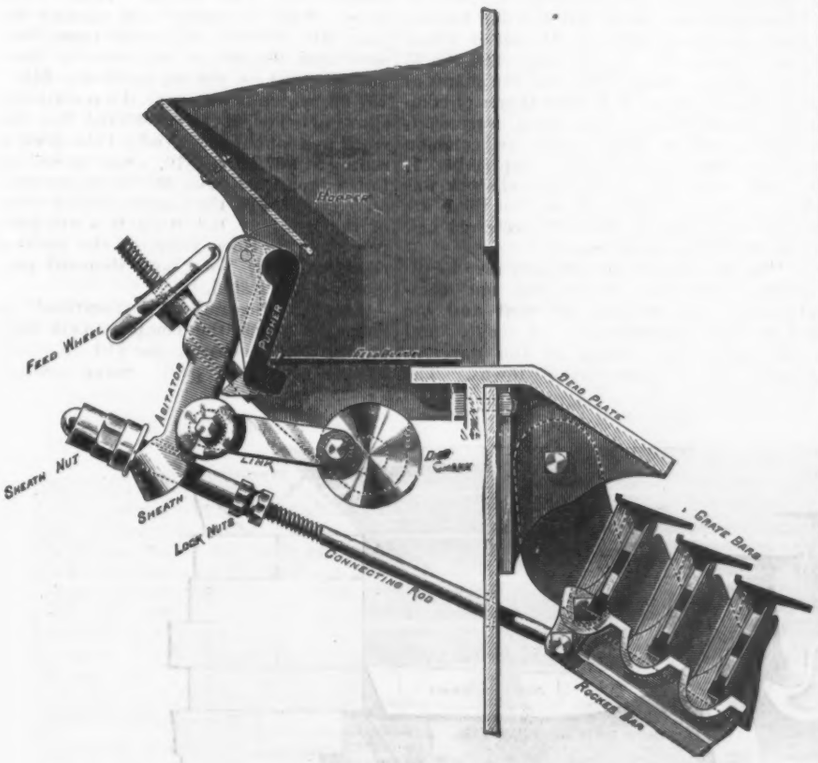



*Fig. 2.—Inclined Position.*

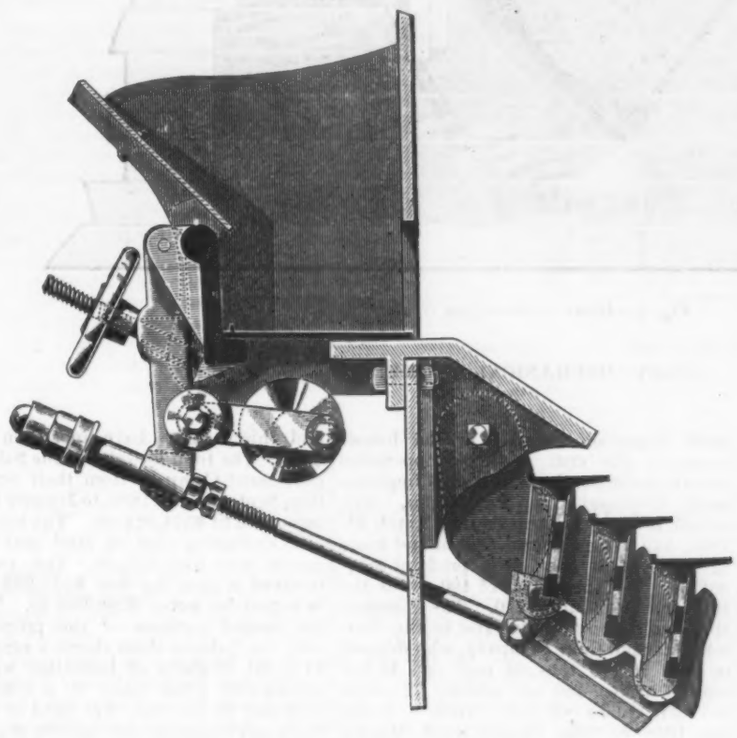


*Fig. 3.—Stepped Position.*

DETAILS OF FEED AND GRATE MOVEMENT RONEY MECHANICAL STOKER.

the fire. The rocking motion is slow, being from seven to ten strokes per minute, according to the kind of coal. This alternate starting and checking motion being continuous, keeps the fire constantly stirred tilts forward, Fig. 4, throwing the cinder into the ash pit, after which it is again closed ready for further operation. The "dumping grate" is made in two parts, so that each half can be dumped separately.

The operation of the stoker, therefore, consists of a slow but continuous feed, a constant stirring of the fire, and an automatic rejection of the cinder, all performed without the opening of fire doors.

For the purpose of facilitating the smokeless combustion of the coal provision is made for supplying heated air to the furnace. When the stoker is erected an air space is left between the fire-brick lining and the red-brick wall of the furnace. Air is admitted to this space through openings in the stoker front, and after becoming highly heated is discharged into a hollow brick chamber immediately over the throat of the hopper, whence it issues through small perforations to mingle with the gas from the fresh fuel. A coking arch of fire brick is sprung across the front of the furnace, covering a part or all the grate, according to the kind of boiler to which it is applied. This arch forms a reverberatory furnace, whose action is to thoroughly coke the fresh fuel and release its gases before ignition. In fact, that portion of the furnace under the arch may be likened to a gas producer, from the throat of which issues a huge volume of heated gas, already partially mingled with the heated air from the side flues, to be quickly burned in the large combustion chamber by contact with the incandescent body of coke on the lower portion of the grates.

Not the least important element in the smokeless combustion is the steady supply of the coal in small but continuous quantity on to the coldest portion of the grate, where, after coking, it is steadily carried down to the hottest portion of the fire at the bottom and finally consumed.

The actuating mechanism of the stoker is simple. All motion is taken from one driving shaft. In a single stoker this shaft is driven from a small engine attached to the stoker front and consuming a hardly measurable fraction of a horse-power. In large batteries of boilers the driving shaft is extended across all the boiler fronts, delivering power to each stoker, and is driven by a small independent engine. The largest stoker can easily be turned over by the hand, indicating the nominal power consumed. The driving shaft carries a disk and wrist pin or a crank, from which a link couples to the "agitator," Figs. 2 and 3. Though the eye of the "agitator" passes a stud screwed into the "pusher," on which stud is a "feed wheel," by which the stroke of the "pusher," and consequently the amount of feed, is regulated. The "agitator" having a fixed stroke, it is apparent that if the "feed wheel" is run down against it in the position shown in Figs. 2 and 3 the "pusher" will be given its full traverse and the greatest feed. If run back to clear the travel of the "agitator" the "pusher" will, of course, have no motion, and the feed will stop. Between these extremes any desired rate of feed can be given. In like manner the rock of the grate bars can be adjusted between any limiting angles, and over a range of motion from no movement to full throw, by means of the "sheath nut" and "lock nuts" on the "connecting rod," and the amount of stirring which the fire receives regulated according to the demand for steam. By these two simple adjustments, within the comprehension of the ordinary fireman, the whole action of the stoker is controlled, and the fires forced, checked or banked at will. There are small doors in the front on each side of the hopper, giving access to the furnace above the grate when necessary.

The stoker is strong and well built, having in view the conditions of its operation and the usual nature of its attendance. There are few pin connections or finished parts. The strains are exceedingly light, and the motion is so slow as to be hardly perceptible to the casual observer. Any

single grate bar can be picked out and replaced even easier than in the ordinary flat grate, and in case it is necessary the lower bar, where the greatest wear takes place, can be replaced without cooling down the furnace, thus avoiding loss of time and fuel.

### Reception and Excursion.

On Wednesday evening the members attended a reception tendered by the citizens of Providence. On Thursday afternoon they visited Rocky Point and inspected a genuine Rhode Island clambake, after which they were taken to the torpedo station at Newport. On the return a stop was made at the Narragansett Electric Light Station, where they found the triple-expansion engines described in Mr. Henthorn's paper. On Friday morning the works of the Corliss Steam Engine Company, the Rhode Island Tool Company and the American Screw Company were visited, the afternoon being devoted to an examination of the Pawtucket Pumping Station.

### Press Reports.

We cannot close without acknowledging the unusual character of the report of the sessions published by the Providence *Journal*. The account was readable and one of the most accurate of a meeting of a technical society we ever saw in a daily paper. J W. Barney wrote the story for the *Journal*.

## The Virginia Development Company.

The second annual report of the Virginia Development Company, of which Richard S. Brock is president, Clarence M. Clerk and S. H. Chauvenet are vice-presidents and E. C. Pechin is manager, states that the company have had an income during 1890 of $150,034.68. The principal items were: Dividends on 7693 shares of Southwest Virginia Improvement Company's stock were $57,672.50; on 500 shares of Graham Land and Improvement Company, $5000; on 100 shares of South Roanoke Land Company, $4000; on 1000 shares of Salem Improvement Company, $7000; profit on sale of Buena Vista lots, $50,300; profit on sale of land to Roanoke Development Company, $4656.12, and on interest and discount, $20,582.31. The expenses were $21,658.53, leaving gross profits of $128,376.15, out of which two dividends aggregating $99,759.65 were paid. During the year 550 shares of preferred stock and 8000 shares of common stock, 20 per cent. paid, were sold, and a call of 15 per cent. on common stock was made, payable September 1, 1890. The outstanding capital stock was thus increased $807,300, so that there are now outstanding $855,000 preferred and $4,000,000 common stock.

The business of the company may be divided into two groups—the one comprising the mining of coal and ore and the manufacture of coke, and the other the aiding of the development of manufacturing towns. The most important interest in the former group is the coal and coke operation known as the Southwest Virginia Improvement Company, at Pocahontas, who mined in the fiscal year ending March 31, 1891, 529,533 gross tons of coal and made 82,473 tons of coke, at a profit of $88,868.30. To their plant of 400 ovens the company are adding 250. The company also own a two-fifths interest in the Norfolk Coal and Coke Company, who shipped in 1890 70,112 tons of coal and 18,844 tons of coke, and are adding 72 ovens to their plant of 220 ovens. Under the title of the Consolidated Mining Company the company operate a number of iron mines, which to some degree have proved disappointing, the Allisonia and Clark Summit mines not having come up to expectations, while the Rocky Mount lease has been abandoned. The principal property is the Rover Mine near Roanoke. On total ore shipments of 65,856 gross tons in 1890, the gross profit was $13,427.44, of which amount $4936.76 was charged off as loss on the Rocky Mount property and $6848.26 as loss on the Allisonia equipment.

A particularly interesting part of the report is, however, that which admits of some conception of the profits realized in town building. The Virginia Development Company own 1000 out of 7822 shares of the Buena Vista Company. That company sold during the year $481,679.79 worth of town lots, and after deducting the cost of land, and all expenses, the net profit was $452,757 56, which is pronounced a remarkable showing when it is considered that the stock was sold at $50. And yet the stock is selling at $67.50 to $70, when, according to the report before us, at "a very conservative estimate of the present selling value of the property the stock is worth $200 per share." How much of the profit is represented by notes and deferred payments is not stated.

Another illustration is furnished by Salem, in which the company held 3000 out of 30,600 shares, par $10, on which 20 per cent. was paid. Seven hundred and thirty shares have since been sold at $15. "The total lot sales of the Salem Improvement Company from their organization, September 24, 1889, to January 1, 1891, amounted to $524,021.89. The net profits after deducting cost of land and all expenses was $421,073.10. The company received in cash for lots $224,032.54 and in negotiable notes $299,989.35. Taking the unsold portions of the property at cost, the balance sheet shows a surplus of $175,261.58 above all liabilities, which is remarkably good when it is considered that only 20 per cent. was paid in on this stock and it appears as a liability at par. At the estimates put upon the unsold property by the officers of the company, there is a surplus of $1,338,448.58." Yet the stock is selling at $14 to $15 and 3020 shares have been turned into the treasury for lots sold since January 1, in acceptance of the offer of the company to take their stock at $30 per share in payment for certain lots.

The Virginia Development Company are also interested to the extent of 1000 shares, $50 paid, in the Central Land Company of Buchanan, with a subscribed capital of 11,990 shares. The company

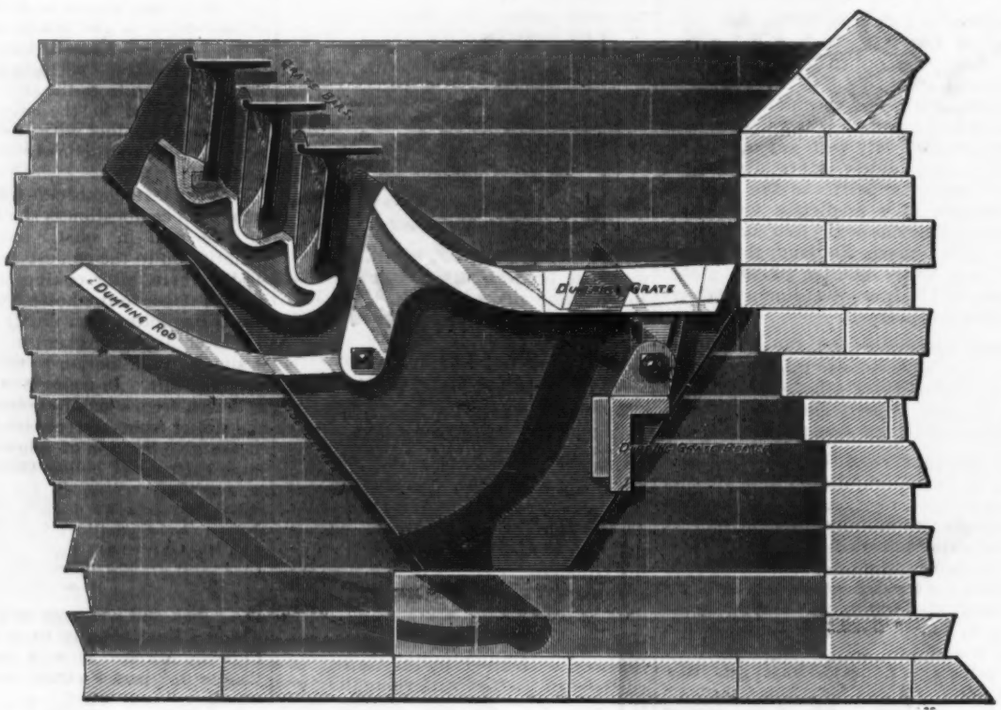



*Fig. 4.—Detail of Dumping Grate.*

RONEY MECHANICAL STOKER.

made in October sales of $658,000 worth of lots at high prices. The report says: "It now appears probable that fully two-thirds of the total sales, or $440,000 worth of lots, will be settled and at prices which will yield a very handsome profit to the company. A great deal of work has already been done, but the building up of the town has yet to be accomplished."

## THE WEEK.

The Joseph L. Colby, the second of the McDougall whaleback steamers built, has arrived at Montreal from Duluth, on her way to the Atlantic seaboard. Another steamer now building is already chartered to carry wheat from Duluth to Liverpool direct.

Constans, the French Minister of the Interior, referring to M. de Lesseps' canal difficulties, says public feeling demands that the famous engineer be put on trial.

A formidable custom league has been formed in Europe, which will be perfected at a conference to be held in Berne, Switzerland, July 20. The league is to be a commercial alliance, in which no one of the contracting powers will be privileged to form a trade treaty with any other outside the union unless it first obtains the assent of the other parties to the alliance. Its existence, it is predicted, will affect the trading relations of the four contracting powers with France, England, the United States, and every quarter of the globe. Germany and Italy are the principal powers immediately concerned.

Among speculators on the Stock Exchange who have come to grief, and whose seats are offered for sale, are Cyrus W. Field, Jr., and Harry Markoe. Friends and money could not save them.

The stagnant condition of the bond market in New York, despite the immense increase in bank reserves, is closely related to prospects for railway construction. A financial writer remarking thereupon, says: "The demand for bonds is the measure of the activity of investment, and investment is the basis of speculation. Old bonds, in respect to which there is a feeling of absolute confidence, sell as high as ever. Their price is such that the buyer gets little more interest on his investment than on Governments. But bonds of the second and third class—that is a different matter. Buyers are distrustful and hold off. Much of the money which went into them has gone into industrial securities, which have not more risk and pay large dividends. The Western roads have absolutely glutted the bond market. The amount they have put out in the past four or five years required a constant and large European absorption, as well as domestic; and now that the former is cut off, and the latter contracted supply is in excess of demand."

Judge Elliott of the Supreme Court in Indiana decides that pumping natural gas out of the State is illegal, under the laws of the State. What will Chicago do?

The "Italy of America" is the Cauca Valley, United States of Colombia, where an American is building a railroad through great coffee fields and sugar plantations. The contract was signed in Bogota on the 26th of August last. It includes the privilege of building extensions to the Gulf of Darien on the north and to the frontier of Ecuador on the south, and from the Cauca River to the Magdalena River. The United States of Colombia guarantees a subsidy of 5 per cent. in gold for 18 years on $63,000 gold per mile, with exclusive privileges for 70 years in a zone extending for 24 miles on each side of the railroad track, with the preference to take all the public lands and all the gold and silver, coal and other mines inside this zone. The contract also includes exemption from duties and all other taxes. An American in Cauca Valley is said to have accumulated $100,000 in the last seven years growing coffee. The railroad will give an outlet for the enormous production.

A machine which furnishes hot water is in successful operation in various parts of Paris. Nine quarts are delivered for 5 centimes. A coil of copper wire inside the machine is connected with a street main, and is heated by gas burners. Housekeepers use the water for making tea, washing and other purposes.

The verdict of the Supreme Court in Philadelphia favorable to the importers in the hat trimmings case of Meyer & Dickinson makes the Government liable for upward of $20,000,000, duties collected.

The Chicago Gas Trust, which has been in danger of extermination from legal proceedings instituted by the city of Chicago, has effected a compromise. By contracts signed by Mayor Washburne, the trust, beginning January 1, 1893, reduces the price of gas to $1 for private consumers, and will pay into the city treasury 3½ per cent. of the trust's gross receipts, the money to be applied on the city's gas bills for street lighting. In return the franchises of the companies in the trust are not to be attacked by the city, and gas mains can be extended anywhere within the city limits.

The silver inflationists are badly disgruntled by Secretary Foster's hesitation to continue silver coinage after July 1. They predict serious consequences in various ways, especially as affecting the aspirations of certain public officers, if their desires are not gratified If the entire monthly purchases are coined, and if certificates are issued representing the profit derived from seigniorage, say 29 cents on the dollar, there would be added to the circulating medium about $14,000,000 per annum, which would help to hasten the ultimate reign of the silver dollar in place of the gold standard. Then the millenum of all the debtor class would commence and speculators hold their Saturnalia.

A conductor on the Canadian Pacific Railway is charged by the United States customs authorities with smuggling goods between Montreal and Boston, thereby defrauding the revenue to the extent of $100,000.

Delaware fruit growers have just sold an enormous strawberry crop and are now confident of gathering from 4,500,000 to 6,000,000 baskets of peaches. The probable receipts are counted at $2,000,000.

A circular has been received in Philadelphia showing that the Alliance Israelite Universelle has arranged to discontinue assisted refugee emigration to the United States, but to divert them to South America and Canada. The Jewish Alliance of America, whose object has been to assist in the distribution of Hebrew immigration to this country, and "to cope with the problem," applied for a charter in the Philadelphia courts.

Secretary Foster's intimation that silver coinage may be suspended after July 1 caused consternation among the ultra coinage advocates.

In the report of the Minister of Finance and Commerce to the President of the Dominican Republic, published in the *Official Gazette*, 23d ult., it is stated that the revenue of the Republic for the year 1890 was: From import duties, $1,355,979.88; from export duties, $279,432.68; total, $1,635,412.57. The value of imports for the year was $2 406,769.76, and of exports, $3,895,109.72; total, $6,301,879.48. Thus it appears that the export value exceeds the import value in the sum of $1,488,339.96.

The Food Manufacturers' Association was organized in this city last week, with the object of bringing the producers, handlers and consumers of foods into closer relationship and to establish cordial relations between the manufacturer and dealer; also to prevent the manufacture and sale of improper food and to elevate and maintain the standard of food; also to hold frequent expositions devoted to food products, and to enlighten the public as to what really constitutes wholesome food, and to make the people realize the importance of proper food.

The North American Commercial Company have lost no time in filing their claim for damages against the Government on account of the closing of Behring Sea to the seal catchers, and the consequent abrogation of the company's exclusive privileges on the Pribilof Islands.

The State Attorney of Pennsylvania will sue the city of Philadelphia to recover money collected by Bardsley, the defaulting city collector, while acting as the agent of the State.

An interesting table of wheat statistics has been compiled by the Chicago *Trade Bulletin* from the Government's June crop report. The estimated yield this year and the actual yield in 1890 are given as follows:

| | 1891. | 1890. |
|---|---|---|
| Winter | 399,024,000 | 255,374,000 |
| Spring | 174,038,000 | 143,888,000 |
| Total | 563,062,000 | 399,262,000 |

The estimated increase of 174,000,000 bushels is, perhaps, a little sanguine, but it must be remembered that as far back as 1884 the United States raised 512,000,000 bushels, and all accounts agree the yield this year will be unprecedented.

The Russian Minister of Finance gives notice that increased expenditure on account of extentive railroad improvements in the country will make increased economy necessary to avoid trouble.

The Poughkeepsie Bridge bondholders saved the property from foreclosure, and now a connection with the New York and New England Railroad will be made.

The wheat harvest is well advanced in Southern Illinois and Southern Indiana and the yield is said to be the best in years. So, too, of Kansas.

French army officers, one of whom was agent of the Armstrong Gun Company in France, have been fined, imprisoned and deprived of civil rights for having sold the secret of the, manufacture of melinite the new explosive.

The reduction of corn duties in France takes effect July 10.

The trustees of the Baron Hirsch fund, who propose to expend in this country about $1,500,000 for the benefit of poor Hebrews, decide to commence the process of amelioration by establishing bath houses in New York City. Happily others than Hebrews are not excluded.

Extensive preparations for grain shipments from this port as soon as the new wheat harvest is ready are making. Both the regular steamship lines and transient steamers have been engaged for months ahead to load for Europe. As the grain is already being gathered in some sections, the forward movement from the interior will soon commence, giving the railroads and lake vessels remunerative employment. Purchases by foreign houses are known to be heavy, no less than 700,000 bushels having been bought at the Produce Exchange by exporters in a single day.

# The Iron Age

New York, Thursday, June 25, 1891.

DAVID WILLIAMS, - - - PUBLISHER AND PROPRIETOR.
CHAS KIRCHHOFF, - - EDITOR.
GEO. W. COPE, - - ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS - - HARDWARE EDITOR.
JOHN S. KING, - - - BUSINESS MANAGER.


## The Tin-Plate Situation.

During the year 1889 a total of about 5,650,000 boxes of tin plate were shipped from Great Britain to the United States, and in the following year 5,300,000 boxes were sent to this country. It is generally admitted that the supply on hand here December 31, 1890, was comparatively small. It is, therefore, a reasonable deduction from the data submitted that the average consumption of tin plate in the United States during the two years quoted was more, rather than less, than 5,000,000 boxes per annum. Shipments to this country from January 1 to May 30, 1891, amounted to about 3,475,000 boxes. During the first half of June about 450,000 boxes were sent, which completes shipments that can reach here before July 1st. This movement is far above the average for the corresponding period of previous years, exceeding that of 1890 by 1,617,000 boxes, and that of 1889 by 809,000 boxes. In these differences is reflected the extent to which supplies have been hurried forward so as to reach American ports before the increased tariff under the McKinley act goes into effect.

At first sight the figures doubtless look imposing and cause many in the trade to arrive at the conclusion that the immediate effect of the increased duty, as far as it bears upon values on this side of the Atlantic, has been discounted in the higher range of prices established within the past six months. On this point, however, there is room for discussion; but the deeper the matter is looked into the stronger appear to be the facts in support of the impression that importations, large as they have been thus far this year, are not of sufficient volume to offset the increased consumption and higher rate of duty in regulating home market values. Last year the canning of fruit and several lines of vegetables was considerably below the average, owing to crop failures in certain sections of the country. The outlet for cans was cut down more or less, and, naturally, the demand for tin plate. Doubtless as much plate was used for kerosene packing last year as in 1889, and that the quantity consumed by packers of beef and meats generally was far in excess of the average of previous years is a matter of record.

In the latter lines the quantity of plates used thus far this year is considerably in excess of that of 1890. Official data show that the export movement of canned goods has increased, and there is reliable authority to warrant the statement that the home consumption has been much larger also. This may be an unimportant factor, in itself, but, when considered in connection with the favorable prospects for large crops of fruits this year, the heavy work done by canneries thus far in some varieties of the same and in various vegetables, the increase is by no means insignificant. In point of fact, the outlook is so favorable for heavy consumption of plates in the canning of food products alone that the large importation is neutralized in a great measure, and lower prices in the near future are dependent almost wholly upon the extent to which American plates may come upon the market and the reduction in cost at the British sources of supply. Up to the present time American plates cut no figure. Should the production of plate in this country gain the rapid strides that the manufacture of other steel and iron has in recent years, the foreign markets need not be so much depended upon in the future.

With the adoption of modern appliances and improvements, the record of the steel rail industry may be repeated, or even excelled. It is patent, however, that the foreign sources of supply will have to be relied upon for some time to come. Out of, say, 5,000,000 boxes of tin plate consumed annually in this country about 1,750,000 boxes go into the manufacture of packages for goods that are sold in foreign markets, upon which a rebate of 90 per cent. of the original duty is paid by the Government to the packers of the goods. There thus remains about 3,250,000 boxes, which represents, approximately, the amount that American manufacturers can reasonably calculate upon having a chance to compete for, and it will doubtless be some time before they get into position to turn out that quantity.

The official figures for the quantities of tin plate re-exported under the drawback clause are, unfortunately, not available for any period later than the fiscal year ending June 30, 1890, but they are accessible for previous years. Leaving out of account the quantities of tin plate in warehouse, which do not vary much, the imports of tin plate and the re-exports under the drawback system were as follows during the fiscal years 1889 and 1890:

*Imports and Re-exports of Tin Plate.*

| | 1889. Pounds. | 1890. Pounds. |
|---|---|---|
| Imports | 735,789,988 | 680,060,925 |
| Re-exports | 166,087,740 | 150,112,007 |
| Apparent home consumption | 569,702,248 | 529,948,918 |

It will be observed that not less than 22 per cent. of the total imports of tin plate were not retained in the United States. We may state that of the entire amounts of drawback paid by the Government during the past few years the sums for tin plate reached nearly one-half. In 1888 the amount was $974,444.33, out of a total of $2,889,356.60; in 1889 it was $1,494,790.10, out of $2,906,473.94, and in 1890 $1,351,008.07, out of a total of $2,771,224.99. In dealing with the quantities of tin plate which they will be called upon to produce in the early future American manufacturers must, therefore, always make allowance for the large percentage of imports, approaching nearly one-quarter of the whole, which their foreign rivals are bound to retain for many years to come.

British makers have, since the period of heavy buying of plates for American account prompted by the passage of the McKinley Tariff bill, reaped enormous profits and worked their mills to the utmost capacity. Having supplied this exceptional demand a curtailment of production has taken place, and surplus supplies at factories and shipping ports are now considerably below the average amount. It is estimated that less than 100,000 boxes remain at British shipping ports at the present time. Prices have been reduced, on the average, about 1/6 (say 37½ cents) per box from the highest prices touched in the foreign markets.

This reduction, however, does not equalize the higher rate of duty as regards cost to lay down supplies in the American market on and after July 1. As a matter of fact, plates would have to be purchased in the foreign market at less than the lowest prices on record to admit of importations here after this month at prices now current. At the very bottom figure ever accepted in the British markets, the cost, plus the new duty, would be $5.40 per box for Penlan grade coke plates delivered in this country; that of J. B. grade cokes would be $5.53; ordinary Bessemer steel, coke finish, about the same as Penlan grade and Siemens steel $5.59. Charcoal plates would cost, on the same basis, about present selling prices, and terne plates 20 cents to 45 cents per box more. It will thus be seen that present prices in this market will, on July 1, have been relatively lower than any ever reached in the foreign sources of supply. The new duty adds $1.30 per box to the cost of importing IC and $1.64 to IX, 14 x 20; $2.60 to IC and $3.28 for IX, 20 x 28, and a corresponding advance on other sizes.

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The International Brotherhood of Boilermakers and Iron Shipbuilders, assembled in convention at St. Paul on the 17th inst., adopted a resolution to establish a nine-hour day, and also indorsed the subsidy bill as passed by the last Congress in relation to ships built in this country. This labor organization evidently looks with hope toward the shipyards of the country for the employment of many more workmen as a result of the policy inaugurated by Congress. But the members do not mean to favor the business of building ships for the foreign trade by any special efforts on their part. They know that with ten hours' work in American shipyards the cost of building vessels here is so much greater than abroad that the Government has been called on to assist the shipping interests, hence the subsidy has been granted to which reference is made. Now the workmen propose to introduce another element of additional cost here by cutting an hour from each working day. It is true they considerately provide that where there are but few men

employed no attempt will be made to reduce the number of hours of labor, but that is because they know their organization will then be too weak to enforce the short day. It would be in much better taste if these workingmen would defer the agitation of a shorter working day in shipbuilding until after the business of building ships for the foreign trade had been fairly established.

### Business Conservatism.

Business men and professional financiers especially have for some months been forecasting the future with reference to the condition of the money market at that season of the year when stringency periodically returns and is considered as being unavoidable. The existing currency arrangements do not provide for expansion in any degree commensurate with these periodic demands, such as attend the movement of the crops immediately after harvest. True, heretofore the Government, by anticipating the payment of bonds from a plethoric treasury, has afforded temporary relief. But hereafter this dependence is cut off. It is in the full knowledge of this fact that a spirit of self-reliance has been engendered, and therefore in the exercise of ordinary business sagacity an unusual conservatism is everywhere manifest. Speculation is discountenanced as if by common consent. The times have not been considered propitious for undertaking an important new enterprise requiring capital. Bankers, both in the United States and Canada, have long since thrown out a cautionary signal in this respect. Although peculiarly noticeable, it is not at all strange, considering the circumstances, that a period of hesitation now supervenes and that some disposition prevails to complain of quiet markets. The immediate effects are seen in the increasing bank reserves and the abundance of idle money at all principal centers, and this after sending $60,000,000 in gold out of the country. Indeed, it would appear extraordinary, in the absence of some obvious explanation, that, in the prospect of excellent harvests near at hand and the certainty of remunerative markets, the feeling of conservatism should be so general and pronounced. The fact, however, is a subject for congratulation and affords ground for assurance that any exigency within the range of probabilities will be successfully met without disturbance. The November panic, business misfortunes in various quarters and disclosures of disgraceful bank management, sometimes coupled with fraud and peculation among high officials, have carried with them a timely admonition and contribute powerfully to the creation of a sentiment which in itself is the best guarantee of continued prosperity. Confidence in the public credit and general soundness of the mercantile classes is unbounded.

Just now the question of free silver coinage is being agitated anew, but our leading financiers are almost unanimous in recommending a conservative course. Thus fortified, the belief is prevalent that Secretary Foster will avail himself of the discretionary power with which he is legally invested and suspend the coinage of silver dollars after July 1, the conviction being general, silver monometallists always excepted, that any inflation above the commercial value of bullion is fictitious. Henry Clews says, and others concur, that "it is better to hold the silver in the shape in which it comes to the Government in bulk; it is thus in a shape to command a market value all over the world." The credit of the Government, with the resources of the country behind it, presents a barrier not easily overthrown.

### Brands Losing Their Prestige.

The time is not far distant when a brand was a term to conjure with. It sold pig iron, bar iron, tool steel, boiler plate, sheet iron and so on all through the list. It was a valuable piece of property, one of the most precious assets, in fact, of a long-established house, and was regarded with all the veneration that attaches to a charm among the ignorant worshippers of blind luck. A brand that had been known in the trade for ten years had an appreciable value; one known for 25 years was a banner of glory to the house owning it; but one familiar to the lips of men for 50 years or more was a veritable gold mine, as it was worth an army of salesmen in both maintaining and extending trade. It might have been merely an X, or the outline of a fish, or a quaint group of letters like Q K Z, but if it had been known to the entire trade to mean a perfectly reliable brand of bar iron or tin plate or tool steel there was a stanch band of customers who would have the goods bearing that stamp and none other, and eloquence was more than wasted in trying to induce them to experiment with brands to them unknown.

Even to this day there is a sort of glamour surrounding a well-known brand or trade-mark whose reputation has been sustained for a long series of years by a product of uniformly high quality. The trade thus secured by a house may in some cases cover quite a respectable percentage of its entire volume of business. Its brand may hence possess sufficient value to keep it prominently in the foreground, and not let the public forget its existence. There is a conservative element which will persistently cling to results of past experience, refusing to make experiments or to hazard a trial of new material. But with the great number of consumers in the United States a brand or a maker's name is no longer of vital importance. This is well illustrated by a story told of a prominent mechanical engineer whose opinion was asked of a brand of steel in extensive use. His answer was that he had had no occasion to give attention to the subject for ten years, and he knew nothing about steel at the present time. It is very likely that if he had been asked such a question in 1880 he would have been found possessed of very strong opinions with regard to the superior qualities of a very few brands. Improvements in steel making in recent years have evidently been so widespread that quality is no longer a monopoly to be claimed by a limited number of steel producers. The same is true of other metal products. There are very few consumers of pig iron who will now pay a premium of 25 cents per ton to secure a special brand, but, on the contrary, almost the entire trade will readily take in an unknown iron if offered them at a slight reduction on current rates and they are given some idea as to its probable character. Foundry practice has very generally abandoned its old position of dependence on special brands, and a new dispensation has been established among foundrymen, who secure good results by methods which have been brought into use within the past decade.

The growth of the business of this country has been too rapid to be bound by ancient traditions. The consumption of iron and steel has increased too much for the maintenance of supremacy by special brands. And hand in hand with the increased consumption there has been an improvement in the selection of raw materials and their manipulation in manufacturing processes which has brought about a general advance in the quality of the product turned out. Consumers still specify to a considerable extent special brands of iron or steel to be used in work made for them, but this practice is giving way to mechanical or chemical tests as the number of high-grade brands increases in every line. The name of a maker is to-day of less consequence than the fact that the material furnished is up to a recognized standard of excellence, as determined by exhaustive tests or authenticated records. But above all as a growing influence determining the attitude of buyers in these latter days is the question of comparative cost. Quality being equal, the brand offered at the lowest price is the most popular.

The report of Alfred E. Fletcher, chief inspector under the English Alkali act, shows that the recovery of ammonia from the gases of blast furnaces and coke ovens has not made very rapid progress in England during the past few years. The recovery of by-products from blast-furnace gases is, of course, limited to those plants which smelt with raw coal in Scotland, where the strike interfered in 1890. The total amount of sulphate of ammonia made from the four principal sources is given in the following table:

*Sulphate of Ammonia Recovered in Great Britain.*

| | 1890. Tons. | 1889. Tons. | 1888. Tons. |
|---|---|---|---|
| Gas works | 102,138 | 100,711 | 92,896 |
| Iron works | 5,064 | 6,145 | 5,280 |
| Shale works | 24,730 | 23,953 | 22,072 |
| Coke and carbonizing works | 2,325 | 2,795 | 2,537 |
| Totals | 134,257 | 133,604 | 122,785 |

Considering that the total amount realized for the product was $7,800,000, the recovery of this waste product may well be dwelt upon as one of the achievements of modern chemical industry.

## The Duty on Plate Shearings.

An extraordinary decision has been rendered by the Board of Appraisers recently in the matter of the duty on ship or boiler plate shearings, over which there has been a good deal of controversy. Under the McKinley bill the appraisers at New York and at Boston placed boiler-plate shearings under the boiler-plate classification, the rate being one-half of 1 cent a pound, on a valuation of 1 cent per pound or less. The importers appealed to the Board of Appraisers, claiming that the shearings should be classified as scrap and the duty be fixed at $6.72 per ton, or three-tenths of 1 cent per pound. This appeal has been sustained, and the rate now established is that of scrap iron.

The shearings are rectangular plates varying in width and length, sheared to marketable shape, from the irregular scrap obtained in trimming rolled ship and boiler plates. They may be sheared into bars of any thickness not less than ⅜ inch and not narrower than 1 inch. These shearings have as imported varied in width from 4 inches to 22 inches and in thickness from $\frac{5}{16}$ inch to ¾ inch. In length they run up to 12 feet, the specifications generally barring out all material shorter than 1½ feet.

Under the old rate of duty these shearings have been imported chiefly for rolling into strips for tack makers, which in itself indicates the quality of the material. A good deal of it is basic steel, produced to meet the requirements of Government inspection and the specification of Lloyd's and the European boiler insurance companies. It will be readily understood by the steel trade that this material is far from being an equivalent of what is generally known as scrap, which must either be piled or melted before it is used. The act of trimming it to regular shape robs it of the characteristic of scrap. Plate shearings are that part of the plate which must be removed to obtain a plate uniform in width and with square ends. An American mill manager who habitually or frequently produced shearings 12 to 22 inches wide would be soon forced to seek a new field of usefulness either by resignation or by bankruptcy of the concern blind enough to keep him.

It will be readily understood how these "shearings" entered at the scrap rate of duty will find a much wider market. They can be reduced by rolling into iron or steel strip in one operation, and can be used for a large variety of purposes. European plate-rolling practice is likely to develop an extraordinary liberality in shearing. Instead of aiming to shear as closely as possible to produce the one straight edge which it is the aim of the shearman to attain, they will allow themselves an additional 10 to 20 inches on either side. The very fact that they make a wide, sheared strip proves that the shearing operation itself is not honest. What is to prevent a mill from trimming a plate 20 feet long by shearing off 5 feet at each end, and cutting this shearing into strips for export to this country as boiler-plate shearings, dutiable at $6.72 per ton?

## OBITUARY.

### COL. GEORGE B. WIESTLING.

Col George B. Wiestling, president of the Montalto Iron Company and superintendent of the Montalto Railroad, died on the 17th inst. at his home, Montalto Park, from apoplexy. He was born in Harrisburg on January 28, 1835. In early life he was a civil engineer in the employ of the Pennsylvania Railroad, and afterward he built the large tunnel at Oxford Furnace, N. J., on the Delaware, Lackawanna and Western Railroad. He served with distinction throughout the war and invented for the Government an attachment designed to assist the movement of heavy artillery through the deep mud of Virginia. At the time of his death Colonel Wiestling was a member of the American Institute of Mining Engineers, a member of the Pennsylvania Forestry Association and a member of the American Micrological Society. Colonel Wiestling was the first president of the United States Association of Charcoal Iron Workers. He was the first to demonstrate that a furnace could be banked over Sunday. He was one of the best-known, most popular and highly respected citizens of Franklin County, in which he had been a resident for 27 years.

### JOHN P. ADRIANCE.

John P. Adriance, one of the most enterprising and esteemed business men of Poughkeepsie, N. Y., died in that city June 18. He had been a sufferer from heart disease for about ten years. Mr. Adriance was born in Poughkeepsie in 1825. His father, John Adriance, was for some years associated with Peter P. Hayes, under the firm name of Hayes & Adriance, jewelers and silversmiths, doing business on corner of Main and Garden streets. John P. Adriance was educated in the old Poughkeepsie Academy. Some years were then spent away from Poughkeepsie, but his studies were completed on College Hill. His first start in business was as a clerk in Storm & Uhl's hardware store, afterward in the same line in New York. He then engaged in the hardware business in Manchester, N. H., and finally in 1852 he became one of the firm of Sears, Adriance & Platt, in New York. In the fall of 1854 the firm purchased the patents of the Manny mowing machine for the New England States, and Mr. Adriance manufactured the Manny Mower at Worcester, Mass., until 1857, when the superiority of a new machine invented by Aultman & Miller attracted his attention, and he secured the patents for this, afterward the famous Buckeye. In the fall of 1859 he returned to his old home in Poughkeepsie and began the building of an extensive manufacturing establishment.

He es ablished his first business in Poughkeepsie in 1857 at the Red Mills, where the Buckeye machine was manufactured until 1864, when the present Buckeye works, under Adriance, Platt & Co., were built. He gave his best energy to the extension and development of this business. Mr. Adriance, though deeply interested in city affairs, repeatedly refused political honors, only once consenting to hold office. Then he represented the Fourth Ward in the Common Council. That was in 1873. He was frequently mentioned for Mayor, but would not allow the use of his name at conventions. John P. Adriance was married in 1848 to Mary J. R. Platt of New York, who survives him. Six children also survive him.

### SIR JOHN HAWKSHAW.

The eminent English civil engineer, Sir John Hawkshaw, who died nearly a fortnight ago, designed the tunnel under the Sevres River, and drew the plans for the proposed Channel tunnel. His name is associated with countless docks, bridges, reservoirs and railways, and not with British enterprises only, either. He had reached the age of 80 at his death.

## CORRESPONDENCE.

### The Tensile Strength of Coplay Iron.

*To the Editor:* We notice in your issue of June 11 an article by C. T. Holbrook with reference to Juniata pig metal and aluminum, in which he speaks particularly of the Marshall Furnace, Newport, and a series of tests of said iron.

While we do not wish to specially criticise his remarks, and presume he firmly believes said tests to be most unusual and worthy of note, we think it only just to our principals, the trade in general, and ourselves, as agents, to state that a number of tests made by us some time since of the Coplay pig metal made at Coplay, Pa., showed a tensile strain of 24,000 pounds, or far beyond any showing so far by Marshall.

This iron is made under the personal supervision of Horace Boyd, probably one of the best furnacemen in this section today, and while we have not gone into the question of aluminum, &c., can make a better showing.

The iron (Coplay) has been used in the manufacture of the finest stove and gas stove plate (about as severe a test as can be had for light work the latter is), and for machinery of the heaviest and most difficult patterns, with utmost success, and could probably give Marshall some points worth knowing. We make this statement simply because we think honor is due where it belongs.

DALLETT & Co.,
Agents Coplay Iron Company.

*Philadelphia, Pa., June 23, 1891.*

The Valley Iron Works of Williamsport, Pa, are erecting extensive works at Lynchburg, Va., which they will occupy when completed. Hereafter the works will be known as the Valley Engine and Machine Company.

The citizens of Duluth, Minn., are raising a bonus of $125,000 for a steel plant at that place.

The Dubuque Brass and Metal Company of Dubuque, Iowa, have failed, with liabilities aggregating $125,000 and assets of not over $75,000. The failure is said to be due to mismanagement.

Johnson City, Tenn., is making strenuous efforts to secure a steel plant for that place, and mass meetings have been held and nearly $100,000 has been subscribed as a bonus. It is proposed to incorporate a company under the name and style of the Proctor Steel Company, with a capital of $500,000.

Cory E. Robinson, who was for a long time the buyer for Clark, Quien & Morse of Peoria, Ill., has recently accepted a more lucrative position with the Lambert & Bishop Company of Joliet.

G. L. Luetscher, formerly chemist at the Ensley plant of the Tennessee Coal, Iron and Railway Company, is now connected with the Southern Steel Company, at Chattanooga, Tenn.

# Brown Hoisting and Conveying Machine

AT THE WORKS OF JONES & LAUGHLINS, LIMITED.

[*With Supplementary Sheets of Engravings.*]

Some time since the Brown Hoisting and Conveying Machine Company of Cleveland, Ohio, erected in the yard of the American Iron and Steel Works, Jones & Laughlins, Limited, Pittsburgh, one of their patent balanced cantilever derricks for the general handling of the material in the yard. Of the accompanying engravings the large one conveys a very good idea of the location of the machine between the river front and the cupolas. It has a clear sweep over the vessels moored alongside the dock, over the cupolas, and to within any point 150 feet from its center. The other two views represent the machinery by means of which the derrick is turned and the load hoisted and conveyed from one point of the yard to another. That portion of the machine shown in the foreground in Fig. 2 drives the drums about which the hoisting and conveying ropes are carried. A double engine, one placed at each side of the main shaft extending along the rear of the machine, provides the necessary power. On this shaft is mounted a pinion meshing with the large gear wheel on the shaft carrying the two drums. The engines can be run continuously, the drum it is desired to operate being thrown in gear by means of the levers shown at the extreme right in Fig. 2 and at the left in Fig. 3. At the opposite end of the machine, and driven by a bevel pinion engaging with the large bevel gear, is the machinery used for turning the derrick. The apparatus has been found to work well, all the motions being perfectly under control of the operator, so that quick and rapid handling of any load within the capacity of the machine is made an easy matter. The pointers shown in the last two engravings indicate the hight of load and its position, and the position also of the derrick itself.

The derrick proper is built on the cantilever plan, now so generally used in bridge practice. It is mounted at the center upon a turn-table carrying the driving plant, suitably housed in a wooden building, through which is a passageway in order that the load may be taken from one side of the derrick through the building to the other. The hight of the tramway track above the yard is 54 feet, the total length of the derrick being 308 feet. The working load is from 2 to 3 tons, although in practice it has been found that the derrick can safely be loaded beyond this point. Provision is made for counterbalancing the load raised on one arm by running a weight out upon the opposite arm. The speed of the traveler on the tramway is 1200 feet per minute. This appliance has proved to be of great usefulness in the yard in handling and stacking pig, bringing it to the proper location, where it can be easily loaded on barrows in the usual way, the unloading and stacking of coke and in the handling of ingot molds. In fact, any heavy weight which it is desirable to move from one part of the yard to another can be quickly picked up and deposited wherever desired without interfering in any way with anything there may be in the yard, or with any work in progress.

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The pig-iron manufacturers of the Mahoning and Shenango valleys are considering the advisability of joining together and establishing a coke plant for the manufacture of coke to be used in their furnaces. At present there is considerable dissatisfaction among the furnacemen in the above places over their inability to secure cheaper coke, and a movement to manufacture their own coke is taken as an outcome of this dissatisfaction. While nothing definite has yet been done, it is not at all unlikely that steps looking to the consummation of the project will be taken in the near future.

## The Eastern Scale.

The Algamated Association of Iron and Steel Workers has just issued the scale proposed for the Eastern mills, which possesses some interest, since there are indications that a determined effort will be made to secure its introduction. Thus far the association has been defeated in its attempts to gain a foothold in the Eastern mills. We learn, however, that a formal demand has been made by the men of some of the works in Eastern Pennsylvania for the adoption of the scale of the association, with the threat that they will go out if it is not granted.

*Puddling.*—No change whatever has been made in the prices, but a third paragraph is added to the accompanying notes :

3. That when half cast-iron swarth and half wrought-iron turnings or scrap mixed with same and worked on cinder bottom, the price shall be 50 cents per ton less than the current price paid for boiling. This applies to working one ball in a single furnace.

*Busheling.*—The rate remains the same with the following note added :

That when busheling scrap and the iron is squeezed or hammered and the same iron reheated, the price shall be $2.60 per ton.

*Large Mill.*—The price has not been changed, but the following note has been added :

The above price in rougher's column is intended for mills where there are only two roughers ; where there are three roughers the above rate to be equally divided.

*Small Mill.*—Some changes have been made in the classification of ordinary sizes, and a note added :

Band iron, 2½ x No. 13, wider and thicker ; band iron, 2½ x No. 12, wider and thicker ; band iron, 2 x No. 12, wider and thicker ; band iron, 1¾ x No 10, wider and thicker ; band iron, 1½ x No. 8, wider and thicker ; band iron, 1⅜ x No. 9, wider and thicker ; bars, 1 x ¼, and all wider and thicker sizes ; flats and scrolls, ⅞ and ¾ x ¾ and thicker ; rounds and squares, ½ and larger ; half-rounds, ⅝ and larger ; skelp iron, 2½ x No. 13 and larger ; ovals, ⅝ and larger ; 1½ x ¼ half-ovals ; half-ovals, 1¼ and larger ; plain horse shoe iron to be classed as other flats.

The extra sizes, first, second, third and fourth class, remain unchanged, except that in the second class cylinder iron is added to the list, while the third class includes ⅞ and ¾ channel iron and the fourth class ¾ channel iron. The following note is added :

That all lighter sizes, according to shape, than specified in fourth class to be paid 50 per cent. extra.

The following is an entirely new scale:

SHEET MILL.

It is agreed that the following scale is based on the Eastern iron manufacturer's card of prices, and shall advance 3 per cent. on each advance of one-tenth of said card, and decline 3 per cent. for every deduction of one-tenth from said card.

*Rollers.*

| Gauges. | Per ton. |
|---|---|
| Nos. 16 to 25 | $1.67 |
| Nos. 25 to 27 | 2.35 |
| No. 28 | 2.60 |

*Catchers.*

| | |
|---|---|
| Nos. 16 to 25 | $0.95 |
| Nos. 25 to 27 | 1.43 |
| No. 28 | 1.58 |

*Spannermen.*

| | |
|---|---|
| Nos. 16 to 25 | $1.17 |
| Nos. 25 to 27 | 1.75 |
| No. 28 | 1.94 |

*Grate Furnacemen.*

| | |
|---|---|
| Nos. 16 to 25 | $1.17 |
| Nos. 25 to 27 | 1.75 |
| No. 28 | 1.98 |

Trimmers, 55 cents per ton, all round ; helpers do., 26 cents per ton ; annealer, 45 cents per ton ; helper do., 34 cents per ton ; box annealing, 27 cents per ton ; helper do., 20 cents per ton.

*Wire Rod Mill.*—The only change is the addition of the following paragraph to the notes :

3. That not less than an average day's wages be paid for all sizes larger than No. 1.

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The contract for the masonry for the new suspension bridge to be erected over the Allegheny River between the cities of Pittsburgh and Allegheny has been let to the Drake & Stratton Company, Limited, of that city, and it is to be completed by December next. The cost of the masonry, which will consist of one pier in the center of the river and abutments at each side, will be $86,300, and the superstructure it is estimated will cost about $500,000. The bridge will have four tracks, two for street cars and two for wagon traffic. The foot passages, one on each side, will be 10 feet wide. This bridge will be used by the Pittsburgh, Allegheny and Manchester Traction Company for transporting their cars from Pittsburgh to Allegheny.

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During the first five months of the current year the exports of tin plate from England destined for this country were 199,686 gross tons, out of a total of 234,896 tons, against 108,234 and 151,490 tons respectively during the same period in 1890.

| When the selling price of bar iron is | Rate per ton therefor, 2240 pounds. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Heater. | Helper. | Roller. | Rougher. | Catcher. | Stick in. | Hook up. | Straightener. | Stocker. | Docker. |
| 2 cents | $0.59 | $0.29½ | $0.64 | $0.34 | $0.21½ | $0.14 | $0.13 | $0.13 | $0.31 | $0.31 |
| 2 1-10 cents | .60⅓ | .30¼ | .66 | .35 | .22 | .14½ | .13 | .13 | .32 | .32 |
| 2 2-10 cents | .62 | .31 | .67⅓ | .36 | .22½ | .14½ | .13½ | .13⅓ | .32½ | .32½ |
| 2 3-10 cents | .63½ | .31¾ | .69 | .37 | .23 | .15 | .14 | .14 | .33⅓ | .33⅓ |
| 2 4-10 cents | .65 | .32½ | .71 | .38 | .23½ | .15½ | .14 | .14 | .34 | .34 |
| 2 5-10 cents | .66½ | .33¼ | .72½ | .38½ | .24 | .15½ | .14½ | .14½ | .35 | .35 |
| 2 6-10 and 2 7-10 cts. | .70½ | .35¾ | .76⅔ | .40 | .25½ | .16⅔ | .15½ | .15½ | .37 | .37 |
| 2 8-10 and 2 9-10 cts. | .74 | .37 | .81 | .43 | .27 | .17½ | .16 | .16 | .39 | .39 |
| 3 and 3 1-10 cents | .78 | .39 | .85 | .45½ | .28½ | .18⅓ | .17 | .17 | .41 | .41 |

*Note.*—All bevels to be classed as half-ovals, according to size or class.

## Washington News.

*(From Our Regular Correspondent.)*

WASHINGTON, D. C., June 23, 1891.

The Ordnance Department of the United States Army is making very careful preparations for the test of the first 12-inch gun according to the latest patterns. It is not probable that the test firing at Sandy Hook will take place for three or four weeks. The carriage is undergoing some alterations and much difficulty is being encountered in bringing the powder up to the standard. The object of these preliminary tests will be to acquire a certain velocity in a certain distance. As that is a question of powder, this part of the combination of certain forces required to produce certain results must be accomplished before the rest is possible.

The powder is being manufactured at the Dupont Mills, and some satisfactory qualities have been delivered, but as yet the run is not even. It is not expected that the first firings of the gun will come up to the standard laid down, but ultimately results are expected which will attract the attention of the ordnance experts of the world. The tube of the present gun is of Creusot, or French, and the jacket of American steel. At the time the tubes could not be manufactured in the United States. In the future the guns will be of American manufacture throughout.

The old proving ground at Annapolis is being broken up as rapidly as the appliances for the test of high-power guns can be transferred to the newly acquired government proving grounds at Indian Head. This establishment will be fitted up with a plant adapted to the proving of every caliber of gun, test of targets and other experimental work connected with modern ordnance and armor.

The general results of the experiments in the recent trial of plates at Indian Head determined that the resisting power of an all-steel plate was satisfactory as far as resisting penetration was concerned, but the cracking of the plate was fatal. The plate with the nickel alloy treated by the Harvey process seemed to meet all requirements for that caliber of gun and thickness. The ordnance authorities are working on the theory of producing a gun which will penetrate at the ratio of 1 inch of caliber to 1 inch of plate. In other words a 5-inch gun to have a penetrating power equal to 5 inches of armor, and so on upward. At this ratio the 10-inch guns will be expected to penetrate that thickness of armor.

The armor plate tests, which will take place as soon as the plates are received from the Carnegie works, are expected to demonstrate the efficacy of steel and nickel alloy plates. The alloy of nickel seems to meet all the objections to the steel plate. It makes the fiber or crystallization more cohesive or tough. It gives even greater resisting quality and removes the liability to cracking. The welded plate which was tried had the same objection as the steel plate, it being impossible to secure an even and pefect weld.

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S. R. Smythe, president of the S. R. Smythe & Laughlin Company, engineers and contractors, of Pittsburgh, Pa., has just closed the following contracts for gas furnaces and gas-producing plants: Richmond Standard Spike and Iron Company, Iron Gate, Va.; two gas-heating furnaces and necessary gas producers; also six double puddling furnaces, having boilers over same for utilizing the waste heat from such furnaces to make steam. From the Ætna Iron and Steel Company, Bridgeport, Ohio, they have a contract for the erection of four gas heating furnaces and necessary gas producers. For the Pennsylvania Tube Works, Pittsburgh, Pa., they are building four additional tube furnaces and eight gas producers. For the Muskegon Iron and Steel Company, Muskegon, Mich., two 15-ton open-hearth steel furnaces, with necessary gas producers, and for the Lukens Iron and Steel Company, Coatesville, Pa., they are making four large gas heating furnaces with necessary gas producers.

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### A New Trades School.

A trades school for boys is proposed at Worcester, Mass. H. H. Bigelow, a prominent citizen there, has offered to the trustees of the Worcester Polytechnic Institutite—and the offer has been accepted—a plant of machinery and tools, which originally cost $100,000, to found such a school. A canvass for funds with which to erect a suitable shop building and furnish the necessary working capital, has been made, but the individual citizens have not responded. The question is now in the hands of the city of Worcester. If the City Government does not establish the school, the gift will go by default. It is the aim of the donor and the trustees that the proposed trades school shall be conducted directly in connection with and as a feeding school for the institute, and the building, if funds can be secured, will probably be erected on the institute grounds.

AN IMPORTANT MOVE IN THE EDUCATION OF YOUTH.

The new school, if the ideas of the men who are behind it are carried out, will be an important move in the education of youths in a trade. As now planned it will be a "half-time" trades school and will be conducted, from the very start, if practicable then, with the idea that the very work of the students will pay for its maintenance. In view of the work which the Polytechnic Institute has been doing in this direction for the past 20 years there is little doubt but that the school can be made self-supporting.

A UNIQUE EDUCATIONAL ESTABLISHMENT.

The Polytechnic Institute stands unique among educational institutions, in that its shops, which give the necessary training of hand and eye to the students in the mechanical engineering department, are made self-supporting through the labors of the students, who turn out, under the direction of instructors, work which is offered no open market in competition with the products of the best manufacturing concerns in the country. Not only is this possible, but the man who graduates from the Institute as a mechanical engineer has not only a thorough mental engineering training, but he has at his fingers' ends a trade by which he can earn the emolument of a skillful machinist, as is proven every year by the actual experiences of some of the graduates. In this thoroughness of shop practice, which is attained by working an average of about 16 hours a week through the whole of a three and one-half years' course, the Polytechnic Institute excels any similar institution.

THE WASHBURN SHOPS.

The Institute was founded in 1865 and has graduated [illegible] classes. The Washburn shops, which constitute the mechanical plant, consist of a three-story brick building, 100 feet long by 40 feet wide, with two two-story extensions, each 35 x 40 feet in size, and a two-story L 75 x 60 feet, where are located boiler, engine, work and store rooms. The iron and wood working machinery is the best that can be procured. When the shops were started in 1869, manual training schools were not popular and many experiments in that direction had failed. The so-called Russian system was not known. The founder of the Institute, John Boynton desired to have a school which would be free to the youth of Worcester county, where studies not usually taught in the public schools could be secured, and which should fit youth for the practical details of life. The founder of the shops, Hon. Ichabod Washburn, had long cherished a plan for such a school, having in mind the training of 20 or more apprentices by a suitable number of practical teachers and workmen. He built and equipped the original shop building and gave a fund of $50,000, the income of which was to be applied toward paying the running expenses of the shops. With the present facilities 145 students are being trained according to the founder's ideas.

A SELF SUPPORTING SYSTEM.

When the solid business men and manufacturers who aided in starting the institute came to consider the matter of paying the running expenses of the shops they decided on the plan of having the shops pay their own expenses, aided by the income from the $50,000 fund, and from that day this has been very nearly accomplished, while other systems of manual training schools have not been so successful. The sales for the first year of the shops' business aggregated $1,532.33. During the five years which followed the annual sales did not reach $10,000. Then they began to steadily increase, and during the 12 months ending May 1 of the present year amounted, in round numbers, to $50,000. The assets have increased from $12,000 to $54,000.

THE PRODUCT OF THE SHOPS.

The manufactures of the shops include machinists' tools, engine and speed lathes, twist-drill grinders, emery grinding machinery, general hydraulic machinery, direct plunger elevators, accumulators, three and four way hydraulic valves, general wood-work and school apparatus, such as models, drawing boards, apparatus for physical laboratories, &c. The shops do not rely on underselling. Full market prices are obtained for the goods, which are superior. Numerous calls for speed lathes come from the Brown & Sharpe Mfg. Company of Providence, R. I., and other of the best machine shops in the country. The plan of operation of the shops, which has been adhered to from the first, is to make its products the best in design, material and workmanship. In addition to turning out superior marketable goods in the regular line of the shops' work, recent graduating classes have constructed a 25 horse-power Corliss engine, a 10 horse-power upright reversible engine, a 40 horse-power Buckeye engine, a 30 horse-power high speed straight line engine, a 26-inch swing engine lathe, a Hendey shaper, a turret lathe and two 16-inch swing engine lathes.

A BUSINESS SYSTEM.

The students are not indispensable to the carrying on of the work, for regular journeymen are employed. They help fill the orders, and, taking an important part in the work as they do, they see all the details of successful business. The Russian system of manual training came to the knowledge of Americans after the institute had been at work several years with its own system, and has not affected the latter in the least. On the contrary, it has been proven to the satisfaction of the institute's men that it is far better to adapt the student to the business wants of a shop than to adapt the machinery, materials and processes to the student, whose product is, in the latter case, not put to use

after it leaves his hands. The knowledge to the student that his work is to go into the market to be used for a definite purpose, gives a stimulus to his efforts and puts a value upon the result of his labors which nothing else can do. He enters enthusiastically upon his shop duties—in fact, they form the pleasantest part of the week to him, furnishing as they do an agreeable break in the round of mental work.

PLAN OF THE TRADES SCHOOLS.

In the light of the above facts, and to further increase the power and influence of the institute, the trustees believe they are justified in asking the support of Worcester for the trades school which it is proposed to conduct along the same lines. The Worcester School Board has passed upon the matter and given the plan its indorsement and encouragement. In the building, which it is planned to erect, 100 apprentices may be accommodated. These apprentices are to be boys who have been promoted from the grammar school to the high school. On the part of the public schools the plan does not require the instruction of an additional number of pupils, but only the adaptation of the studies of these pupils to their shop course. According to the half-time idea, the work of the week would be divided as follows: Monday forenoon both divisions of the class would have a general exercise; Monday afternoon and Tuesday forenoon, one division would be in the school room and the other in the shop. Tuesday noon they would change with each other. Thus they would alternate during the rest of the week, always making the change at noon, and so always having an afternoon and the following forenoon continuous, either in the school or in the shop, the week's work for both divisions ending Saturday noon.

A PART OF THE PUBLIC SCHOOL SYSTEM.

It is intended that the book training branch of the school shall be confined to the city's schools. This branch of the half time school would be a part of the public school system, while the shop training branch would be wholly independent. The scheme would require no serious change in the work of the public schools, except to change the instruction of 100 boys, so that one-half of the time each week could be devoted to work in the special shop. It would require less room, with less seating capacity and less teaching force, to accommodate the pupils during the time they would be in the school room, and would tend to relieve the crowded schools to this extent.

FREE SCHOLARSHIPS A FEATURE OF THE SCHOOL.

It is intended that the tuition shall be as low as possible, at the start, and an effort will be made to secure free scholarships for boys who cannot afford to pay tuition. The course will at first train only machinists, pattern makers and other workers in wood and metal, and will guarantee the boys who successfully complete the course a standing as journeymen in their trades. The profits on the sales of manufactured articles are expected to be sufficient to pay the running expenses of the new shop when it is once started and fully under way.

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The shrinkage which has taken place in the value of securities is supposed to have much to do with the present financial condition of the country. Senator Calvin S. Brice estimates that the United States has been making for some time past an average of $500,000,000 of securities a year, one-half of which has been absorbed by Europe, where there is no longer any sale. The consequent depression of prices is widely felt, many railroads having suffered severely, and the liquidation now taking place will entail severe losses among those who have invested. Good crops will help to ameliorate the situation.

# MANUFACTURING.

### Iron and Steel.

The South Boston Iron Works of South Boston have been acquired by an English syndicate, who will also build the new works at Middlesborough, Ky., begun by W. P. Hunt.

The stockholders of the Burden Iron Company of Troy, N. Y., have elected the following as trustees: James A. Burden, I. Townsend Burden, John L. Arts, Richard Irvin, Nicholas J. Gable. The trustees elected the following officers: President, James A. Burden; general manager, John L. Arts; secretary, Nicholas J. Gable.

The Sharpsville Furnace, of the Sharpsville Furnace Company, at Sharpsville, Pa., which has been idle since February last on account of the coke strike, was put in operation last week.

Advices from New Castle, Pa., under date of 19th inst. state that stock to the amount of $219,000 has been subscribed toward the erection of a new steel plant in that city. It was stated that the new concern will be composed exclusively of New Castle capitalists. It is understood that the New Castle Wire Nail Company of that place will be largely interested in the new venture.

Over $100,000 has been subscribed to the stock of the newly organized Atlanta Iron and Steel Casting Company, and the erection of a foundry at Atlanta, Ga., will begin about July 1. The company propose to manufacture malleable iron castings of all kinds and convert them into steel by the Bates process.

The Tacoma, Wash., Chamber of Commerce has appointed a committee to investigate the iron resources of that State, with a view to building a blast furnace should the investigation develop suitable deposits of ore.

The Burden Iron Company, Troy, N. Y., are erecting two buildings, each 220 x 50 feet, to be used as cooper and repair shops. The wooden structure now used for this purpose will be torn down. The works of the company will be closed this week and will remain idle until September, during which time extensive repairs will be made.

No. 1 Thomas Furnace of the Pioneer Mining and Mfg. Company, at Birmingham, Ala., has blown out for relining and general repairs, after making 110,200 tons of pig iron during a continuous run.

It is stated that Carnegie, Phipps & Co., Limited, of Pittsburgh, will in the near future make an arrangement with the creditors of the Columbia Iron and Steel Company of Pittsburgh, whose plant is located at Uniontown, Pa., by which they will put the plant in operation. It will be remembered that the Columbia Iron and Steel Company made an assignment several months ago, since which time their plant has been idle. The officials of the company endeavored to secure an extension of five years from the creditors, but it seems have not been successful. While the arrangement with the Cornegie people by which they will operate the plant has not yet been consummated, there seems to be but small doubt that it will be made. The plant of the Columbia Iron and Steel Company, which turns out structural shapes exclusively, is one of the finest in the country, and if operated under conservative management will no doubt realize handsome profits. At the time of their failure the Columbia Iron and Steel Company had some very desirable contracts on hand, one of which was the structural material for the new Masonic Building in Chicago.

The Lockridge Furnace of the Thomas Iron Company at Alburtis, Pa., after an idleness of some months was put in operation last week. This company operate 11 stacks, only one of which, Saucon, at Hellertown, is now idle.

The Alleghany Mining and Development Company are reported to have decided to build a rolling mill and nail mill at Clifton Forge, Va.

It is reported that Watts Brothers contemplate adding a Bessemer plant to their steel works at Middlesborough, Ky., at a cost of nearly $500,000.

### Machinery.

Wm. Tod & Co. of Youngstown, Ohio, received an order last week from the Pennsylvania Steel Company for some additional hydraulic machinery for the new steel plant which that firm are erecting at Sparrows Point, Md. This firm are also constructing some special machinery for the Pittsburgh Malleable Iron Company of Pittsburgh, and recently sold a Porter-Hamilton engine to the Cleveland Hardware Company, at Cleveland, Ohio.

The Carroll-Porter Boiler and Tank Company of Pittsburgh have just completed an order for four tanks 10 feet in diameter and 30 feet long, to be used in storing crude oil at the new steel plant of the Pennsylvania Steel Company of Sparrows Point, Md. The firm will use crude oil exclusively as a fuel at this plant.

Among recent orders received by the Pittsburgh agency of the Murphy Iron Works of Detroit, Mich., for the Murphy type of stokers, were four for a 500 horse-power battery of Babcock & Wilcox boilers, to be placed in the Tenth Street mills of the Oliver Iron and Steel Company of Pittsburgh; four for a 500 horse-power battery and six for three batteries, 416 horse-power, of Babcock & Wilcox boilers, to be placed in the wire-rod mills of the Oliver & Roberts Company, Limited, at Pittsburgh. The Hainsworth Steel Company, also of Pittsburgh, are erecting ten of these stokers under two 500 horse-power batteries and one 416 horse-power battery of Babcock & Wilcox boilers. Marshall, Kennedy & Co. are putting in three of these stokers under a 600 horse-power battery of Stirling boilers. The Pittsburgh Telephone Exchange are putting in two under a 280 horse-power tubular boiler, and the Jackson Building one under 50 horse-power tubular boiler. The makers of this type of stokers state that they now have 800 in actual operation, representing about 150,000 horse-power of different types of boilers. The second stoker built by them at Lockport, N. Y., in 1880, for the American District Steam Supply Company, is still in successful operation.

The machine and blacksmith shops of the Missouri Car and Foundry Company, at St. Louis, Mo., have been burned. The loss is estimated at $20,000.

The National Mfg. Company have filed articles of incorporation at Seattle, Wash. The capital of the company is $250,000, and their object the manufacture of railroad cars, agricultural and mining machinery.

The stockholders of the Battle Creek, Mich., Machinery Company have voted to increase the capital stock of the company from $30,000 to $70,000.

An addition, 36 x 17 feet, has been added to the foundry of the H. B. Smith Company, at Westfield, Mass., in order to make room for a new 80 horse-power boiler.

A company has been organized to build an iron foundry on the Rancocas Creek, near Mount Holly, N. J.

The Arrow Rock Machine Shop Company have been organized at Marshall, Mo.

The creditors of the Muskegon Car Company, Muskegon, Mich., which shut down about three months ago, have reorganized under the name of the West Michigan Car and Machine Company, the capital stock being $250,000. The works will be put in operation again at once.

The Springfield Pump and Mfg. Company have erected new shops at Springfield, Mass., for which they will soon desert their present quarters at Chicopee.

The Clipper Mowing Machine Works, at South Keene, N. H., including foundry, machine shop and forge shop, have been destroyed by fire, involving a loss of $30,000, on which there was an insurance of $13,000.

The Cochrane Roller Mills Company of Escanaba, Mich., manufacturers of flour-mill machinery, pumps and general mining machinery, have decided to locate works at Basic City, Va.

The Exeter Machine Company of Exeter, N. H., will build branch works at some points in the South yet to be selected, in order to meet the demands of their Southern trade.

The Russellville Iron Foundry, at Russellville, Ky., will shortly be put in operation.

The Covington Machine Company, capitalized at $500,000, have been incorporated at Covington, Va.

The Arcade File Works of Sing Sing, N. Y., have signed a contract to transfer their operations to Anderson, Ind.

### Hardware.

The hardware trade will be interested in the following announcements from Chicago: The next manufactory decided to be located at Harvey, a new manufacturing suburb of Chi-

cago, is that of the Bellaire Stamping Company of Bellaire, Ohio. This company have ample capital and a long-established reputation for excellence in their manufacture of lanterns, stamped tinware, lamps, enameled steel ware and sundry hardware specialties. Their plant will be erected in the West Division center at Paulina and 145th streets, at a cost of $75,000 to $100,000, and will employ about 500 hands. Representatives of a great German firm which manufactures the fine blue enamel ware which is so extensively imported at high prices have been quietly looking the country over for a site in the United States. They have at last selected Porter as the site for an immense factory. Incorporated as the Vienna Enamel and Stamping Works they have had surveys made of a site, and contracts for building are to be let this week. They expect to have 200 men at work by January, and within three years, when the stamping works are finished, to employ 6000, the number employed in the home factory. Large inducements were offered at other places, but the natural advantages of Porter, which is in the new Stock Yards region, with its great advantages for receiving raw material and shipping out the products by lake and rail, finally induced them to go there.

The Eastern State Asylum for the Insane, at Pontiac, Mich., has recently been equipped with improved iron balcony fire escapes by E. T. Barnum, the well-known manufacturer of wire and iron work, Detroit, Mich. These fire escapes, we are advised, embody a novel and ingenious feature in being inclosed entirely with guards of wire work so arranged that in case of fire or panic the inmates cannot throw themselves over, but may descend to the ground in safety.

### Miscellaneous

A meeting of the stockholders of the Pruyn Mfg. Company was held at Hoosick Falls, N. Y., last week, to vote on the question of increasing their capital from $50,000 to $110,000, and engage in the manufacture of the Wrinkler Dynamo, &c. The vote was in the negative. A call for another meeting will soon be issued for the purpose of voting on the question of increasing their working capital $15,000 to $20,000. This question will probably receive an affirmative vote.

The Albany Fire Apparatus Company have filed with the Secretary of State at Albany, N. Y., a certificate of the payment in full of their capital of $50,000. The subscribers to the capital stock are: Levi Dederick, Louis W. Pratt, George Poe, Allen Dederick and Aaron Veeder.

The new plant now being erected by the Bostwick Metal Lath Company, at Niles, Ohio, is nearing completion, and will probably be ready for operation within 30 days. The company are composed almost exclusively of Youngstown, Ohio, capitalists.

The adjourned meeting of the stockholders of the Westinghouse Electric and Mfg. Company, which was to have been held in the Westinghouse Building, Pittsburgh, Pa., on Tuesday, the 23d inst., has been postponed until Tuesday, July 7. George Westinghouse, president of the company, was in Pittsburgh last week, and stated that further adjournment was necessary, because the Committee on Reorganization had not received sufficient stock to proceed. He further stated that almost 100,000 shares had been surrendered, and he was confident the required amount would be surrendered by the time the next meeting was held.

The Pittsburgh Reduction Company of Pittsburgh, manufacturers of pure aluminum, have filed a motion against the Cowles Electric Smelting and Aluminum Company for a temporary order restraining the latter firm from lowering the price of aluminum below $1.50 per pound. An order was issued by the courts in Cleveland some time ago, restraining them from selling aluminum for less than $1.50 per pound, but it was directed against that company only. The plaintiffs now claim that another company, known as the Cowles Syndicate Company, and which in reality is the English branch of the company against whom the suit was brought, have advertised aluminum at 90 cents. They claim the Cowles Company are trying to evade the order of court.

As soon as the plant of the East Lebanon Chain Works Company, now building at East Lebanon, Pa., is completed the company will begin the making of 2½ miles of very heavy chain for the navy.

S. D. Hubbard of Pittsburgh announces that he has disposed of his entire interest in the Nellis-Hubbard Company, engaged in the manufacture of agricultural implements, located at Butler Station, on the West Penn Railroad, Allegheny County, Pa.

At a meeting of the Board of Directors of the Westinghouse Air Brake Company of Pittsburgh, held at Wilmerding, Pa., last week, a dividend of 5 per cent. out of the earnings of the three months ending on the 31st was declared. Transfer books of the company will be closed from July 1 to July 10, both dates inclusive.

The Short Electric Railway Company of Cleveland, Ohio, have entered suit against the Westinghouse Electric and Mfg. Company of Pittsburgh for alleged infringement of a patent gearless electric motor. It is claimed that the patent has never been contested, but the officials of the Westinghouse Electric and Mfg. Company state that they are confident of the validity of their claims

The Board of Directors of the Pittsburgh and Lake Angeline Iron Company have elected the following officers: James Laughlin, president; Jno. W. Chalfant, vice-president; W. G. Pollock, secretary and treasurer; Alfred Kidder, mine agent, and Executive Committee as follows: James Laughlin, Jr., Jno. W. Chalfant, W. G. Pollock, Geo. M. Laughlin and W. C. Quincy. An Auditing Committee has also been appointed, consisting of W. C. Quincy, W. L. Jones and W. G. Mather.

The American Vault, Safe and Lock Company have been organized at Pittsburgh, and application has been made for a charter. The incorporators are John B. Sheriff, John Collier, Jas. R. Wiley, Ebenezer E. Patterson and John P. Patterson.

The Maryland Bolt and Nut Company, capitalized at $100,000, have filed articles of incorporation at Baltimore.

At attempt is being made in London to reorganize the United States Rolling Stock Company, which failed last fall at Siegewisch, Anniston and Decatur, Ala., where the works of the company are located. The plan outlined in a circular to the stockholders calls for a total capitalization of $8,250,000.

## The Scotch Iron Gamble.

The London *Economist* thus refers to the recent movements in Scotch iron:

Since we last wrote a good deal has happened in connection with the iron trade, and we have from week to week referred to the "gamble" which has been going forward in Scotch pig iron warrants at Glasgow. The ordinary business of speculation in these documents has lately developed into a deadly duel between London and Glasgow, in which the latter city seems to have been severely worsted, and heavy spoils have gone to the victors. Many months since it was known that London was buying Scotch iron very largely, and a great portion was bought from "bears," who, by persistent selling, were successful in pushing the price down from 54s. to 46s., even during the time that the great bulk of the furnaces in Scotland were stopped by the strike of the furnacemen (which lasted about six months). After the conclusion of the strike, the "bears" continued their tactics, and again pushed the price still further down, until 42s. was reached in March. During all this time no efforts were made by the London operators to take up the warrants they had bought, but they were left floating on the market, large quantities, it is understood, being loaned to the "bears" from time to time. In the month of May, however, a very decided change came over the market, warrants were taken up, in such large quantities that they soon became scarce, and when the scramble on the part of the "bears" once began the price rapidly advanced from 45s. 7½d. until 58s. 10½d. was paid on May 29. Since that time there have been severe fluctuations, and the price in Glasgow fell to 45s. 6d. by June 8 (a fall of 13s. 6d. per ton in a week). This sudden reaction was probably caused by the almost complete closing of the "bear" account, and by the fact that some who have been looking for a still further advance took fright when they saw a sudden fall. The market has since steadied and advanced a little, as there is no evidence of any large quantity of iron being thrown on the market, and it is just possible that all the iron bought by the London operators is not yet delivered to them. If this should turn out to be the case, high prices may again be seen.

# TRADE REPORT.

## Philadelphia.

Office of *The Iron Age*, 220 South Fourth St., PHILADELPHIA, Pa., June 23, 1891.

**Pig Iron.**—There is a remarkable amount of sameness both as regards demand and supply, and consequently little or no change in prices. Some days things look a little stronger, other days the reverse, while at the end of the week or the month the actual changes have been so slight as to be almost imperceptible. At this particular time there is positively nothing upon which to base definite ideas as to the future, unless it may be that there will be no changes of special importance. In some respects the market has a firm appearance, in others it looks the reverse of firm, but taking everything into consideration there is no reason to expect anything materially different from what we have had during the past two or three months; a little firmness in one direction, a little weakness in another, and so on *vice versa*. At present the strength is in good Foundry Irons, Mill Irons showing irregularity and in some cases weakness, but even in extreme cases the variations do not exceed 25¢ to 50¢ ₱ ton at most, and a good deal of that is due to special circumstances. Iron that is "off quality" or that is forced on unwilling buyers must necessarily be shaded a little, while brands that are close sold up and that are in constant demand can easily be maintained at full market rates. This is, in fact, the position to-day, some brands that are pressed for sale are weak and irregular, but those who require particular brands or particular qualities have no alternative but to accede to sellers' terms. This leaves the future as unsettled and as hard to forecast as ever, so that for the time being consumers are buying only for immediate wants, leaving the market to take its own course, feeling pretty confident that no great risks are incurred by so doing. Sales during the week chiefly in small lots at about the following figures (delivered):

| | | | |
|---|---|---|---|
| Ohio Softeners, No. 1x | $19.00 | @ | $19.50 |
| Ohio Softeners, No. 2x | 18.00 | @ | 18.25 |
| Standard Penna, No. 1x | 17.75 | @ | 18.00 |
| Standard Penna, No. 2x | 16.50 | @ | 17.00 |
| Medium Penna, No. 1x | 17.25 | @ | 17.50 |
| Medium Penna, No. 2x | 16.00 | @ | 16.25 |
| Virginia, No. 1x | 16.75 | @ | 17.50 |
| Virginia, No. 2x | 15.75 | @ | 16.00 |
| Standard Neutral All-Ore Forge | 14.50 | @ | 15.00 |
| Ordinary Forge Cinder mixed | 14.00 | @ | 14.25 |
| Hot-Blast Charcoal | 20.00 | @ | 22.00 |
| Cold-Blast Charcoal | 24.00 | @ | 27.00 |

**Muck Bars.**—Market somewhat quiet, as consumers are unwilling to pay the figures demanded by holders. There are buyers at $26.75, delivered, but $27 @ $27.50 is asked, and it is only in exceptional cases that these prices have been shaded. With continued hot weather, some people confidently look for still higher figures than now quoted, but buyers appear to be supplied for the present.

**Steel Billets.**—Prices are firm, but business is very inactive. There is a good deal of inquiring around, but for some reason or other it does not seem to result in business. Asking prices are $28 and upward for Billets and $27.75 for Nail Slabs, for such deliveries as Philadelphia or Schuylkill Valley, and possibly 50¢ less for Harrisburg and the Susquehanna Valley, but as so many inquiries fail to result in business to those quoting, as above stated, it is surmised that some large concern must be feeding them out at less money. Nevertheless the feeling is stronger and it looks as though these or higher prices had come to stay.

**Steel Rails.**—No variation from the monotony of the past several weeks. Small lots sell pretty freely, and mills

keep full for several weeks ahead, but large orders are still held in abeyance, although the chances of lower prices appear to be growing less promising as the season advances. Sales $30 at mills, but in some cases a little more money is asked.

**Ferromanganese.**—There is a fair demand for small lots, with sales at $64 @ $65 for 80 %, duty paid. Price according to quantity and delivery.

**Bar Iron.**—Business is fairly active, and prices show an improving tendency, although nothing important in the way of large orders can be reported The demand is largely in anticipation of the mid-summer suspension of work, but is sufficient to keep the mills very busy for the remainder of the month. For later deliveries there is not much doing, as manufacturers are inclined to quote full prices, which buyers are not prepared to concede until the position is more fully developed than it is at present. Usual asking prices 1.75¢ @ 1.85¢ for city deliveries and 1.65¢ @ 1.70¢ at points in the interior; concessions not as easily obtained as during the several weeks immediately preceding.

**Skelp Iron.**—Demand languid, with free sellers at 1.75¢, delivered, for Grooved and 1.70¢ bid. A few small sales reported at 1.72½¢, delivered.

**Plates.**—Market shows steady improvement as regards the demand, but as yet there is little or no change in prices. Boiler work is quite active, while the demand for bridge and miscellaneous work is coming up quite nicely. Mills are all pretty well supplied with orders, some say they are beginning to feel crowded, but all the same buyers appear to find some one ready to enter their orders at about the old prices, although if the demand continues, as seems likely enough, it will not be long before we have to quote an advance. Meanwhile for lots delivered prices are about as follows:

| | Iron. | Steel. |
|---|---|---|
| Tank Plates | 2.00 @ 2.10¢ | 2.05 @ 2.20¢ |
| Refined | 2.20 @ 2.30¢ | 2.05 @ 2.10¢ |
| Shell | 2.30 @ 2.40¢ | 2.40 @ 2.50¢ |
| Flange | 3.20 @ 3.30¢ | 2.50 @ 2.75¢ |
| Fire-Box | 4.00 @ 4.25¢ | 3.00 @ 3.50¢ |

**Structural Material.**—There is quite an active demand for early deliveries, and mills have about all the work they can handle for the present. There is a considerable amount of negotiation going on in regard to large work for the last half of the year, but we cannot learn of anything new as definitely closed, although prospects in that direction are considered quite favorable. Meanwhile prices remain as before—say: Angles, 2.05¢ @ 2.10¢; Sheared Plates, 2¢ @ 2.10¢, and 10¢ @ 15¢ more for Steel, according to requirements. Tees, 2.5¢ @ 2.6¢; Beams and Channels, 3.1¢ for either Iron or Steel.

**Sheet Iron.**—Demand not active at the moment, although a good many large orders have been entered, and the outlook for the last half of the year is fairly encouraging Prices weak on inferior makes, others steady at about the following prices:

Best Refined, Nos. 14 to 20.....3.00¢ @ 3.10¢
Best Refined, Nos. 21 to 24.....3.10¢ @ .....
Best Refined, Nos. 25 to 26.....3.20¢ @ 3.30¢
Best Refined, No. 27.....3.40¢ @ .....
Best Refined, No. 28.....3.50¢ @ .....
Common, ¼¢ less than the above.
Best Soft Steel, Nos. 14 to 20 .....3¢ @ 3¼¢
Best Soft Steel, Nos. 21 to 24.....3⅛¢ @ .....
Best Soft Steel, Nos. 25 to 26.....4¢ @ .....
Best Soft Steel, Nos. 27 to 28.....4¢ @ .....
Best Bloom Sheets, ¼¢ extra over the above prices.
Best Bloom, Galvanized, discount.... @ 67½ %
Common, discount..... @ 70 %

**Old Rails.**—There is no demand for Iron Rails, and prices may be quoted as anywhere from $20.50 to $22, according to circumstances. Old Steel Rails are quoted $17.50 @ $18.50, according to lengths and point of delivery, with sales chiefly at about $18, delivered.

**Scrap Iron.**—Market very dull, but for such lots as consumers require prices realized are about as follows: No. 1 Railroad Scrap, $20.50 @ $21, Philadelphia, or for deliveries at mills in the interior $21 @ $22, according to distance and quality; $15 @ $16 for No. 2 Light; $14 @ $15 for best Machinery Scrap; $13 @ $14 for ordinary; $15 @ $16 for Wrought Turnings; $10 @ $10.50 for Cast Borings, and nominally $24 @ $25 for Old Fish Plates, and $16 @ $17, delivered, for Old Car Wheels.

**Wrought-Iron Pipe.**—Small sizes are in good demand, but prices are weak and irregular, although nominal discounts remain as follows:

Butt-Welded Black.....55 %
Butt-Welded Galvanized .....45 %
Lap-Welded Black.....65 %
Lap-Welded Galvanized.....52½ %
Boiler Tubes, 2½ inch and under.....55 %
Boiler Tubes, 2¾ inch and larger.....60 %

## Cincinnati.

*(By Telegraph.)*

Office of *The Iron Age*, Fourth and Main Sts., CINCINNATI, June 24, 1891.

**Pig Iron.**—There have been no striking features in the market, but a steady consumptive demand for early delivery of Gray Forge on the basis of $10 at the furnace, and this price is accepted for deliveries running through the year. No. 2 Foundry has also been in good demand, with $11 accepted in some instances for prompt shipment and early delivery, but for larger deliveries there have been sales at $11.25 at the furnaces. Neutral Forge has sold as low as $9.50, but nothing under $10 is acknowledged for Gray Forge, and there does not appear to be any reason why less should be accepted, for the furnaces in the South have not accumulated any great surplus. The sales generally were not in large quantities, but in the aggregate the volume of business was satisfactory considering all the circumstances. There were 2000 tons of Standard Southern Car Wheel Iron sold for prompt shipment, and another 2000 tons for August and September delivery, at quotations. There were immediate sales of Ohio Softeners to our repair shops. There are indications that the repair shops are contemplating an increased volume of business, but in other lines there are no evidences that the consumption of Iron will be enlarged in the early future. Quotations are unchanged, as follows:

| | |
|---|---|
| *Foundry.* | |
| Southern Coke, No. 1 | $14.75 @ $15.00 |
| Southern Coke, No. 2 | 13.75 @ 14 00 |
| Southern Coke, No. 3 | 13.25 @ 13 50 |
| Ohio Soft Stone Coal, No. 1 | 16.50 @ 17.00 |
| Ohio Soft Stone Coal, No. 2 | 15.50 @ 16.5[illegible] |
| Mahoning and Shenango Valley | 17.00 @ 17.50 |
| Hanging Rock Charcoal, No. 1 | 20.00 @ 21.00 |
| Hanging Rock Charcoal, No. 2 | 19.00 @ 20.00 |
| Tennessee and Alabama Charcoal, No. 1 | 16.00 @ 17.00 |
| Tennessee and Alabama Charcoal, No. 2 | 15.00 @ 16.00 |
| *Forge.* | |
| Gray Forge | 12.75 @ 13.00 |
| Mottled Neutral Coke | 12.25 @ 12.50 |
| *Car Wheel and Malleable Irons.* | |
| Standard Southern Car Wheel | 19.25 @ 19.75 |
| Hanging Rock, Cold Blast | 25.00 @ 26.0[illegible] |
| Lake Superior Car Wheel and Malleable | 18.00 @ 18.50 |

It is the Radford Pipe and Foundry Company of this city who are putting up an extensive plant in Radford, Va., who have leased the Anniston, Ala., Pipe Works.

Matthew Addy & Co. of Cincinnati, have been appointed sole agents for the Lady Ensley Pig Iron, made at Sheffield, Ala.

## Chicago.

*(By Telegraph.)*

Office of *The Iron Age*, 59 Dearborn street, CHICAGO June 24, 1891.

**Pig Iron.**—No improvement has developed since our last report. The quiet condition of trade is now looked upon as a natural state of affairs as the facts become better known concerning the business done last month. Its extent was almost without precedent in this market, especially among the implement manufacturers, who have evidently very enlarged views of the coming year's business. Local Coke Irons show no change, except that sellers' views are a little firmer, and there is still some scarcity in certain grades. The Southern furnace companies show more disposition to work for orders, and are not opposed to making long deliveries at current prices. Some sellers are rather anxious, in fact, and it is quite probable that on a few brands prices would be shaded. Only moderate orders are to be had just now, but Soft Iron is in better demand than other grades. The situation in Charcoal Iron is about the same as last week—a few inquiries that may lead to business. The cheap sellers are not out of the way yet, as has so long been fondly hoped, but are still naming low prices. The local foundry trade is now threatened with disturbance on account of the Architectural Iron workers' strike, which promises to extend to the molders. Although the Architectural foundries are not so important as they once were, still the Iron trade is in no condition to have any branch upset by labor troubles. We quote for cash, f.o.b Chicago:

| | |
|---|---|
| Lake Superior Charcoal | $17.00 @ $18.00 |
| Local Coke Foundry, No. 1 | 15.50 @ 16.00 |
| Local Coke Foundry, No. 2 | 15.00 @ 15.50 |
| Local Coke Foundry, No. 3 | 14.50 @ 15.00 |
| Local Scotch | 16.00 @ 16.50 |
| Ohio Strong Softeners | 18.00 @ 18.50 |
| Southern Coke, No. 1 | 16.00 @ 16 50 |
| Southern Coke, No. 2 | 15.00 @ 15.50 |
| Southern Coke, No. 3 | 14.50 @ 15.00 |
| Southern, No. 1, Soft | 15.00 @ 15.50 |
| Southern, No. 2, Soft | 14.00 @ 14.50 |
| Southern Gray Forge | 14.00 @ 14.50 |
| Southern Mottled | 13.00 @ 14.00 |
| Tennessee Charcoal, No 1 | 18.00 @ .... |
| Alabama Car Wheel | 22.50 @ 23.50 |
| Coke Bessemer | 17.50 @ 18.00 |
| Hocking Valley, No. 1 | 17.00 @ 18.50 |

**Bar Iron.**—The mills reaching this market have been competing very sharply for orders the past week, and reported prices are current both on car specifications and jobbers' orders. The local mills generally are asking 1.68¢ @ 1.70¢, half extras, but these rates have been shaded $1 ℔ ton or more by outside competitors It is now asserted that the cheap sellers are no longer in the market, having either secured all the business needed for some time, or else having made arrangements to shut down in July. The valley mills quote 1.55¢ at mill, but are taking business at points further west on a basis lower than a parity with Chicago, being assisted, it is understood, by low rates by lake transportation lines: Car builders talk of large orders, but so far have not found themselves in shape to put out specifications.

**Structural Iron.**—The Architectural Iron workers' strike seriously affects the demand from the city trade, but country business continues good. Large contracts, nevertheless, are still being given out here, as arrangements have in most cases gone too far to be countermanded now. The Cook County abstract building, taking over 2000 tons of Columns, Beams, &c., was let on Monday, and larger contracts are yet to follow.

**Other Manufactured Iron.**—Plates are the subject of better inquiry and the outlook is a little more encouraging. Local prices are unchanged, but the mills are asking from $1 to $2 ℔ ton more for

Tank Steel now that they have disposed of their product for a considerable time ahead. In Black Sheets nothing new has developed, but the weakness among jobbers continues. Galvanized Iron is selling somewhat better, but prices have not improved.

**Merchant Steel.**—If any further season contracts have been placed the fact is not generally known. The week, therefore, appears to have been rather quiet. General consumers have bought only small lots, and the railroads are still out of the market. Prices show no change, carloads being quoted as before—viz.: 2.30¢ for Machinery Steel, 2.40¢ for Open-Hearth Spring, 2.30¢ for Tire and 2¢ for Bessemer Bars, all from good stock. Tool Steel sells at 7¢ @ 7½¢ and upward, according to quality.

**Track Supplies.**—The demand for Steel Rails grows heavier steadily, but is not yet up to proper proportions for the season. Large contracts are under negotiation, and the prospects for a heavy trade are brighter than at any time this year. Prices have been affected, and while $31 can still be done by the very best class of customers, the market has advanced to $31.50 @ $32. Spikes are dearer. They are now quoted at 2.10¢ @ 2.15¢, but are hard to get at the inside rate. Splice Bars have been in some demand. They continue to be quoted at $1.85¢ @ 1.90¢ for Iron and 2¢ for Steel, but exact price depends on point of delivery. Track Bolts with Nuts are selling at 2.80¢ @ 2.90¢. Old Iron Rails are quoted at $23, with moderate sales at that price. Old Steel Rails fetch $14.50 @ $16.50, according to size and condition, but are in light demand.

**Old Car Wheels.**—Better trade is reported, but nothing approaching activity is to be expected until the car-building trade revives. Meanwhile the stocks of Old Wheels are accumulating, and consumers and dealers are alike looking for a decided slump at an early day. Quotations range from $16 to $16.50, according to quantity.

**Scrap.**—Large consumers having bought all the Wrought Scrap they needed for the present, the market was quiet the past week, but prices showed the effect of the movement, as they remained very firm on all high-grade material. Cast Scrap and Steel are a little lower. We quote as follows, per ton of 2000 pounds: No. 1 Railroad, $19; No. 1 Forge, $18.50; No. 1 Mill, $14; Fish Plates, $21; Axles, $23; Pipes and Flues, $13; Horseshoes, $18; Cast Borings, $8; Wrought Turnings, $11.50; Axle Turnings, $13; Machinery Cast, $12; Stove Plates, $8.50 @ $9; Mixed Steel, $11; Coil Steel, $14.50; $15.50; Leaf, Tires, $16.

**Metals.**—Casting Copper continues to advance. Bottom here on carload lots is 12¢, and the market still has an upward tendency. Makers are not disposed to hold offers open long. Consumers allege that at a little more advance they will turn to the use of Lake, which can still be had at 13¢. Spelter is firmer, as the price of Ore has advanced, and besides a number of the leading producers are out of the market. Prime Western is now quoted 4.95¢. In Pig Lead dealers report that prices at this center have declined a little for spot metal, and the market has been comparatively quiet. Some 500 tons have changed hands, however, at prices ranging from 4.25¢ to 4½¢, spot and futures.

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The Scully Castle Company, with warehouses at 62–66 South Canal street, Chicago, have been appointed agents for the Lukens Iron and Steel Company of Coatesville, Pa. They will carry a full line of Plates and Boiler Makers' Supplies, so that deliveries can be made on the spot when required.

## Detroit.

WILLIAM F. JARVIS & Co., Detroit, Mich., under date June 22, say: The volume of business for the past week has been large, and especially has this been true of Lake Superior Charcoal Iron, but prices have not advanced. The feeling is quite general that business for the last half of the year will be much more active than for the first half, yet buyers seem to be able to secure what they need at present figures. While this is true at the present time, yet an advance is liable to take place without any warning and when it is least expected. We are able to report a good volume of business, and at prices at least no lower than several weeks ago, and quote as follows:

| | |
|---|---|
| Lake Superior Charcoal, all numbers | $18.00 @ $18.50 |
| Lake Superior Coke, Bessemer | 18.00 @ 18.50 |
| Ohio Blackband (40 per cent.) | 18.00 @ 18.25 |
| Lake Superior Coke Foundry, all ore | 18.00 @ 18.50 |
| Southern No. 1 | 16.25 @ 16.50 |
| Southern Gray Forge | 14.00 @ 14.50 |
| Jackson County (Ohio) Silvery | 18.00 @ 18.50 |

## Cleveland.

CLEVELAND, June 22, 1891.

**Iron Ore.**—A most thorough canvass of the Iron-Ore district shows that the sales of new Ore to date are between 4,500,000 and 5,000,000 tons—an amount fully equal to the estimates made one month ago of the total output for the year. There have been few changes from the prices given in these quotations when the ice was broken and the initial sales made five or six weeks ago. *The Iron Age* has been the only paper giving any reliable information whatever regarding these big transactions. Local papers, with one exception, have insisted that the sales thus far made were insignificant and that much of the Ore reported sold was last season's output left over. The facts are that this unsold Ore amounted to only about 100,000 or 150,000 tons, while the initial purchases in May, given exclusively in this paper, aggregated 650,000 tons. It is not thought that the total sales for the season will greatly exceed 600,000 tons. The high-grade Bessemers from the Minnesota mines and the Menominee and Gogebic ranges are already well sold up, and really desirable non-Bessemers are not easy to obtain. The Ore handlers' strike did not terminate last week, as was expected, but is now over, the men accepting 11¢ per ton. About 40,000 tons of Ore have gone forward to the furnaces during the past ten days, and the railroads are very busy clearing up the docks. Vessel rates are practically unchanged. There has been talk of raising the rate from Escanaba to Cleveland to 60¢ ₱ ton, but charters are still being made at 55¢, while the Ashland rate is 80¢. Good Gogebic Bessemers are selling for $4.40 @ $4.60, and Non-Bessemers for $3.60 @ $4.15. Additional sales of high grade Minnesota Ore at $5.25 @ $5.50 are reported.

**Pig Iron.**—The outlook is decidedly brighter and the demand is increasing daily. Inquiries are still largely confined to immediate needs, but the amounts asked for are larger than for several weeks before. Bessemers are in excellent favor and Mill Irons are seized with considerable avidity whenever attainable. Cleveland quotations are as follows:

| | |
|---|---|
| Nos. 1 to 6 Lake Superior Charcoal | $18.50 @ $19.50 |
| Nos. 1, 2 and 3 Bessemer, per ton | 16.50 @ 17.00 |
| No. 1 Strong Foundry, per ton | 15.70 @ 16.70 |
| No. 2 Strong Foundry, per ton | 15.00 @ 15.50 |
| No. 1 American Scotch, per ton | 16.70 @ 17.70 |
| No. 2 American Scotch, per ton | 15.70 @ 16.70 |
| No. 1 Soft Silvery, per ton | 16.50 @ 17.50 |
| Mahoning and Shenango Valley Neutral Mill Irons, per ton | 14.80 @ 15.80 |
| Mahoning and Shenango Valley Red Short Mills, per ton | 15.00 @ 15.50 |

**Old Rails.**—The demand is fair for Old Americans at $22.50 @ $23, but with only a few scattering sales reported.

**Scrap.**—Not much is being done. All grades of Scrap are quoted on the basis of $19.50 for No. 1 Railroad Wrought.

**Manufactured Iron.**—There has been a fair number of inquiries during the week and prices are quite firm at 1.60¢ @ 1.65¢ for Common Bar.

*Later.*—The general improvement in the Iron market has had the effect of advancing the freight rates on Ore from all upper lake ports. The rate from Ashland and Two Harbors to lower lake ports is now 90¢; from Marquette, 80¢, and from Escanaba, 60¢.

## New York.

Office of *The Iron Age*, 96-102 Reade street,
NEW YORK, June 24, 1891.

**American Pig.**—The situation has not changed materially during the past week, although there is some pressure to sell on the part of near-by furnaces. The furnaces of the Lehigh Valley have benefited to some extent by the lowering of the cost of Lake Ores. Non-Bessemers have been purchased at a figure which makes cost 8¢ a unit at furnace in the valley. Northern brands are quoted at $16.75 @ $18 for No. 1; $16 @ $16.50 for No. 2, and $14 @ $14.50 for Gray Forge. Southern Irons sell at $16.25 @ $17.25 for No. 1; $15.50 @ $16.25 for No. 2; $15.75 @ $16.50 for No. 1 Soft, and $14 @ $14.50 for Gray Forge.

**Spiegeleisen and Ferromanganese.**—A large Western works is now offering 30 % Spiegeleisen at $29, delivered at buyer's works in Eastern Pennsylvania. There are rumors of sales of foreign Spiegel. Ferromanganese is quiet at $64 @ $64.50.

**Billets and Rods.**—Eastern mills have bought some domestic and some foreign Billets, the former including one block of 6000 tons of Soft Billets for three months' delivery. Contradictory reports come from the West. While it is stated that $24.50 has been accepted for a years' contract from July to July, it is unquestionably true that a leading Pittsburgh seller has withdrawn $25 and is now asking $26. There is a movement on foot to place the whole Soft Steel trade on a better footing. So far as we can learn the aim is to organize an association similar in its scope and in its methods to the Rail Association, in order to carry the price up to $30 and distribute territory. One Rail mill has already agreed to sign an agreement not to make Soft Billets. A further heavy movement in Wire Rods is reported from the West. It is stated that the stocks of Wire Nails have been very rapidly absorbed, and that the trade in Barb Wire keeps up remarkably well for the season. So far as the export Wire trade is concerned, the expiration of the Barb Wire patents will throw open to American makers the Australian market, which was reserved to the English and German licensees.

**Steel Rails.**—The largest order placed during the week with Eastern mills was one lot of 2000 tons for Savannah delivery. The market continues exceedingly dull, and it is not expected that there will be any marked activity during the next month. We continue to quote $30.75 @ $31 at tidewater.

**Rail Fastenings.**—We continue to quote Fish Plates 1.70¢ @ 1.75¢; Bolts, 2.60¢ @ 2.65¢, and Spikes 1.90¢ @ 1.95¢, delivered.

**Manufactured Iron and Steel.**—The mills in this vicinity are still pushed to provide for work delayed during the strike. The inquiry for new work is moderate. We quote Angles, 1.95¢ @ 2.10¢; Sheared Plates, 1.95¢ @ 2.25¢;

Tees, 2.45¢ @ 2.75¢, and Beams and Channels, 3.1¢, on dock. Steel Plates are 2¢ @ 2.15¢ for Tank, 2.3¢ @ 2.6¢ for Shell, and 2.5¢ @ 2.7¢ for Flange, on dock. Bars are 1.7¢ @ 1.9¢, on dock.

**Swedish Iron.**—The market is weak. We quote Rivet Rods, $55 @ $56, and Bars, Western specifications, $64 @ $65, at tidewater.

## Louisville.

LOUISVILLE, KY., June 22, 1891.

**Pig Iron.**—The market continues quiet, with no sales of any magnitude reported for the week just closed, the buying principally being in carload and 100-ton lots for prompt delivery, though there is yet some inquiry for round lots deliverable the latter part of the year, which furnaces as a rule are not inclined to take at the figures buyers are willing to pay. The nominal quotation of the principal furnaces is $11.25 for No. 2 Foundry, Birmingham; $11, however, is probably nearer the figure at which sales are being made, more generally for near-by delivery. We quote for cash, f.o.b. cars Louisville, Ky.:

| | |
|---|---|
| Southern Coke, No. 1 Foundry | $14.50 @ $14.75 |
| Southern Coke, No. 2 Foundry | 13.75 @ 14.25 |
| Southern Coke, No. 3 Foundry | 13.25 @ 13.75 |
| Southern Coke, Gray Forge | 12.75 @ 13.25 |
| Southern Charcoal, No. 1 Foundry | 16.00 @ 17.00 |
| Southern Car Wheel | 19.00 @ 20.00 |

## St. Louis.

OFFICE OF *The Iron Age*, 214 N. Sixth st., ST. LOUIS, June 22, 1891.

**Pig Iron.**—The market continues in much the same condition as last noted. Inquiries, however, are more plentiful and indicate an increasing interest in the market. Prices fail to show any improvement, however, and sales of large quantities are made only by shading these prices. The outlook is considered more encouraging, as the crop prospects are improving daily. No 1 Foundry is in good demand, as is also Gray Forge. Car-Wheel Irons are moving freely, as car works are very busy and railroads are more inclined to give them work. Taking everything into consideration the market can be referred to as fairly satisfactory. We quote as follows for cash, f.o.b. St. Louis:

| | |
|---|---|
| Southern Coke, No. 1 Foundry | $15.75 @ $16.00 |
| Southern Coke, No. 2 Foundry | 14.50 @ 14.75 |
| Southern Coke, No. 3 Foundry | 14.00 @ 14.25 |
| Gray Forge | 13.25 @ 13.50 |
| Southern Charcoal, No. 1 Foundry | 17.50 @ 18.00 |
| Southern Charcoal, No. 2 Foundry | 17.00 @ 17.50 |
| Missouri Charcoal, No. 1 Foundry | 15.50 @ 16.00 |
| Missouri Charcoal, No. 2 Foundry | 15.00 @ 15.50 |
| Ohio Softeners | 17.50 @ 18.75 |

**Bar Iron.**—Business continues in a fairly satisfactory condition and mills are running full. Prices do not show any tending toward weakness, as mills refuse to shade the prices quoted herewith. Lots from mill command 1.70¢ @ 1.75¢, delivered on cars at East St. Louis. Small lots from store command 1.82½¢ @ 1.87½¢.

**Barb Wire.**—The demand is not as heavy as last week and prices are correspondingly weaker. We hear of sales of Painted from mill at 2.70¢ @ 2.75¢. The market at present is: Painted, 2.70¢ @ 2.75¢; Galvanized, 3.25¢ @ 3.30¢, according to quantity.

**Wire Nails.**—No improvement to report in this department. Sales are made on the basis of $2 @ $2.05 for carload lots from mill. Jobbers report a stagnation in the demand and are doing little or nothing in this direction.

(*By Telegraph.*)

**Metals.**—There is no change of importance to note in Pig Lead during the past week. A sale of 100 tons was made yesterday at 4.30¢ for August delivery; offerings are limited at from 4.25¢ to 4.30¢. The tone of the market is strong. The demand for Spelter is fairly active, and offerings are made at from 4.70¢ to 4.75¢. Consumption keeps up, and the outlook is considered favorable for higher prices in the near future. There are no specially large sales to report, but a steady demand for medium sized lots prevails.

Matthew Addy & Co., St. Louis, Mo., have been appointed exclusive agents in St. Louis and vicinity for the well known Lady Ensley furnace. The product of this furnace is well known to the trade and has achieved an enviable reputation wherever introduced.

## Pittsburgh.

Office of *The Iron Age*, Hamilton Building, PITTSBURGH, June 23, 1891.

**Pig Iron.**—The market for Bessemer Iron continues fairly active, and prices as compared with those ruling at the date of our last report are a shade lower; however, the demand for the present appears to be pretty well satisfied, and many consumers have covered their requirements for the next month or two. In regard to Forge Iron there is nothing especially new to note, with the exception that there is rather more inquiry and a stronger feeling being developed on the part of city furnaces, some of whom are refusing to make additional sales at current rates. Sales of some 6000 tons City Forge were reported, all at $14, cash, and several lots of Bessemer at $16.20 @ $16.40. We quote as follows:

| | | |
|---|---|---|
| Neutral Gray Forge | $14.00 @ $.... | cash |
| White and Mottled | 13.00 @ 13.50. | " |
| All-Ore Mill Iron | 14.50 @ 14.75. | " |
| No. 1 Foundry | 16.50 @ 17.00. | " |
| No. 2 Foundry | 15.50 @ 16.00. | " |
| No. 3 Foundry | 14.75 @ 15.00. | " |
| No. 2 Charcoal Foundry | 21.50 @ 22.00. | " |
| Cold-Blast Charcoal | 25.00 @ 27.00. | " |
| Bessemer Iron | 16.25 @ 16.50. | " |

Included in the sales reported was a lot of 1000 tons Kentucky Forge Iron from the Ashland district at $13.75, cash. So far as we are advised there has been no Alabama Iron sold here for some time past, as it cannot be put on this market in competition with home Irons. All-rail freight from the Sheffield district to Pittsburgh is, if we mistake not, $4.50 ₱ ton; of course it can be transported by water for considerably less, but river transportation is very unreliable at this season of the year.

**Muck Bar.**—The continued hot weather has stimulated the demand, and we have to report a fairly active and firmer market, with sales of good, strong neutral at $26.50 to $26.75, cash, mostly at $26.50. Those mills making a specialty of Muck to sell are pretty well sold up, and there is but little offering in consequence, although most of the mills are still able to make about all they want.

**Manganese.**—The demand continues small, while the price remains unchanged at $66.50 for 80 % domestic.

**Manufactured Iron.**—The Merchant Iron trade is picking up, orders are coming forward more freely, and the mills generally appear to have about all they can do; one of our largest mills, Jones & Laughlins, report that they are running full in all departments double turn. The indications now are that the railroads will be large buyers during the last half of the year both of Iron and Steel. Prices remain unchanged, although for desirable orders buyers still have the advantage. Bars, 1.65¢ to 1.70¢; Plate and Tank, 2.10¢ to 2.15¢; No. 24 Sheet, 2.75¢ @ 2.80¢, 60 days, 2 % off for cash. Skelp Iron is still quoted at 1.62½¢ @ 1.65¢ for Grooved and 1.85¢ @ 1.90¢ for Sheared four months, or 2 % off for cash. In the Mahoning and Shenango valley district prices are still quoted on a basis of 1.55¢ @ 1.60¢ for Bars, with the mills there reported as being pretty well sold up, some large orders having been placed there recently by Western car builders.

**Nails.**—The Cut Nail trade is still reported as being slow, with no quotable change recently in prices, $1.55 @ $1.60, 60 days, 2 % off for cash. There is an increasing demand for Wire Nails, and the market is firmer. Some of the factories are sold from one to two months ahead. So far as we can learn there are no sellers under $1.90, f.o.b. at factory, and some makers are indifferent about accepting any but desirable orders at that figure. At the recent meeting of the Wire Nail manufacturers in this city it was agreed not to sell beyond ten days ahead, which measure, if adhered to, will, it is believed, be productive of good results.

**Structural Material.**—There is an increasing inquiry, which, it is believed, will sooner or later lead to a considerably increased business. This important branch of the Iron and Steel business has been affected more by the labor complications than any other, and it is certain now that a great many contemplated improvements have been abandoned for this year, as it is too late now to commence, even if the labor troubles were over. The carpenters here have been out since the 1st of May, by reason of which there is but little work for stone masons, bricklayers, plasterers, painters, &c. Prices remain unchanged: Channels and Beams, 3.10¢; Angles, 2¢; Steel Sheared Bridge Plates, 2.10¢ @ 2.15¢; Universal Mill Plates, Iron, 2.05¢; Tees, 2.60¢; Refined Bars, 1.80¢ @ 1.85¢.

**Steel Plates.**—There has been no recent change in prices. New business is not very abundant, but the mills still appear to be pretty well employed on old contracts. Tank, 2.10¢; Shell, 2.45¢; Flange, 2.65¢; Fire-Box, 3.90¢ @ 4.25¢.

**Merchant Steel.**—Crucible Tool Steel, 7¢ @ 7½¢; do., Spring Steel, 4¢; do., Machinery, 4½¢ @ 5¢; Bessemer Spring Steel, 2½¢; do., Machinery, 2.40¢ @ 2.50¢; do., Toe Calk, 2½¢; Tire Steel, 2.20¢; do., Bars, 1.85¢ @ 1.90¢, full extras. There is a fair business reported, but it is not what it should be and usually is at this season of the year.

**Barb Wire.**—Business is reported a little slow, and it is intimated that the prices established some time since by the manufacturers' syndicate are not in all cases adhered to. We continue to quote as before, however, as we have no knowledge that the syndicate prices are being cut: Ghidden Painted, $2.85; do. Galvanized, $3.40; Four-Point Painted, $2.80; do. Galvanized, $3.30, in car lots f.o.b at factory.

**Steel Rails.**—Orders are still reported as coming forward pretty freely, and the outlook at present warrants the prediction that business will be much better the last half of the year than it has been the first half. Prices firm but unchanged at $30, f.o.b. at mill.

**Old Rails.**—The Old Iron Rail market continues dull, and prices remain unchanged at $22.50 @ $23. Old Steel Rails continue in demand for remelting, with sales at $17.50 @ $18.30 for short and long pieces.

**Wrought-Iron Pipe.**—There is a fair business, although it is not what it usually is at this season of the year. Prices remain: Discounts on Black Butt Pipe, 55 %; on Galvanized do., 45 %; on Black Lap, 65 %; on Galvanized do., 52½ %. Boiler Tubes, all sizes up to 2¼-inch, 55 %; 3 to 6 inch, 65 %, 7-inch and upward, 55 %; Casing, all sizes, 55 %.

**Railway Track Supplies.**—There is an increasing demand, but no change in prices. Spikes, $2 @ $2.05, f.o.b. at makers' works; Splice Bars, either Iron or Steel, 1.80¢ @ 1.90¢; Track Bolts, 2.75¢ with Square and 2.85¢ with Hexagon Nuts.

**Billets and Slabs.**—Steel Billets and Slabs continue in demand, and the market is firmer. We now quote at $25.50 @ $26, f.o.b. at makers' works.

**Old Material.**—Dealers generally report trade as being dull, with little or no change in prices. No. 1 R. R. Wrought, $19, net; Cast Scrap, $13.50 @ $14, gross; Old Car Wheels, $16.50 @ $17; Steel Rail and Bloom Ends, $16.50 @ $17.

**Connellsville Coke.**—There is an increasing demand, but no change in prices. Blast Furnace Coke, $1.90 ℔ ton; Foundry $2.30; Crushed Coke, $2.65, all f.o.b at ovens.

## Metal Market.

**Pig Tin.**—In the absence of local incentive to operations or any new move in the London market, speculation has been on a limited scale. Purchases for distribution by jobbers and for consumption have proceeded in the usual manner, and involve about the quantity of Tin generally taken at this season of the year. Supplies here, as well as in London, are believed to be under close control, and prices yield but little, despite the quiet condition of the market. Ten-ton lots were sold early in the week at 20.70¢, net cash, but were subsequently offered at 20.65¢, and on Wednesday sold at that price. Twenty tons for June delivery went at the same figures, and 10 tons for October at 20.55¢.

**Copper.**—Lake Superior Ingot is quoted at 13¢ for prompt delivery, but there are more sellers than buyers at that price, and it is possible that small quantities may be secured at a shade less. Home consumers are buying only for immediate wants, which, as yet, appear to be rather small, and there is little or no new movement on export account. Arizona Ingot, being in moderate supply, is held at 12½¢ upward, and common casting brands, for the same reason, are valued at 11¾¢ @ 12¢ by the smelters. The demand for these cheaper varieties is moderate, however, and the strength of the market lies chiefly in the heavy shipment of furnace material to Europe and relatively high price for the same in the foreign market.

**Lead.**—Dealings in this metal have been confined almost wholly to single carload lots and the entire business makes a very modest exhibit. There is no sign of any change in the attitude of producers or consumers. Outside interest is small and lifeless. Sales have been chiefly at 4.40¢ @ 4.45¢, which prices fairly reflect market value at this writing.

**Spelter.**—The demand for Western has been freer and several fair-sized lots passed into consumers' hands, with result of stiffening prices. All offering at 4.95¢ for early shipment was cleaned up and 5¢ subsequently paid. At the close the latter was named as strictly inside price, while 5.10¢ was bid for a carload for prompt delivery.

**Antimony.**—The movement has been slow and the market is still rather weak, without further important change in values. Hallett's quoted at 12¢ @ 12½¢, LX at 13¢ and Cookson's at 14¢, in wholesale quantities.

**Tin Plate.** — The market is practically at a standstill. Of the heavy importation during the past 30 days a good many thousand boxes are controlled by other persons than regular dealers, and, as a matter of course, there is considerable speculation as to what course those holders may pursue. In some quarters is is stated that a considerable quantity of Plates will have to be sold upon expiration of letters of credit, which is not far off, but elsewhere it is claimed that a large part of the outside holdings is in strong hands and unlikely to be forced upon the market. However, the uncertainty is such that no one will venture to bid on round lots for the time being and outside of a small jobbing business there is no movement at the present time. Prices cannot be quoted with any accuracy. The following are given as fair "nominal" rates for large lines: Coke Tins—Penlan grade, IC, 14 x 20, $5.30 @ $5.35; J. B. grade, do., $5.40 @ $5.45; Bessemer do., $5.35 @ $5.40; Siemens Steel, $5.50 @ $5.55. Stamping Plates—Bessemer Steel, Coke finish, IC basis, $5.75 @ $5.80; Siemens Steel, IC basis, $5.90 @ $6; IX basis, $6.95 @ $7. IC Charcoals—Melyn grade, $6.30 @ $6.35; for each additional X add $1.50; Allaway grade, $5.90 @ $5.95; Grange grade, $6 @ $6.05; for each additional X add $1. Charcoal Ternes—Worcester, 14 x 20, $5.62½; 20 x 28, $11.37½; M. F., 14 x 20, $7.40 @ $7.50; do., 20 x 28, $15; Dean, 14 x 20, $5.15; do., 20 x 28, $10.30; D. R. D. grade, 14 x 20, $4.85; do., 20 x 28, $9.85 @ $9 90; Mansel, 14 x 20, $5; do., 20 x 28, $9.90; Alyn, 14 x 20, $5.10; do., 20 x 28, $10; Dyffryn, 14 x 20, scarce; do., 20 x 28, $10.50. Wasters—S. T. P. grade, 14 x 20, $4.75; do., 20 x 28, $9.30; Abercarne grade, 14 x 20, $4.70; do., 20 x 28, $9.25.

### New York Metal Exchange.

The following sales are reported:

MONDAY, June 22.

30 tons Tin, July,..... .... ....20.70¢

TUESDAY, June 23.

20 tons Tin, September.... ..... .....20.60¢

## Imports.

**Hardware, Machinery, &c.**

Boker, Hermann & Co., Arms, cs., 38
Bugenac, —, Mach'y, pgs. 8
Carhardt & Blanchard, Mach'y, cse., 1
Downing, R. F. & Co., Chains, cks., 22; Mach'y, cs., 4
Fitch, Geo. R., Mach'y, pgs., 24
Folsom, H. & D., Arms, cse., 1
Godfrey, Chas. J., Arms, cs., 28
Hartley & Graham, Mdse., cs., 37
Johnson, John, Mach'y, pgs., 26
Jordan, A. J., Gun barrels, cs., 12
Kennedy & Moon, Mach'y, cs., 6
Lau, J. H. & Co., Arms, cs., 14
Lundschilz, Schaja, Mach'y, pgs., 11
Pollock, L. C., Wire Rope, coils, 12
Schoverling, Daly & Gales, Arms, cs., 21
Sellers, W. B., Mdse., cs., 5
Schoonmaker, A. O., Metal Shears, cse., 1
Werlemann, H., Arms, cs., 6
Wiebusch & Hilger, Gun Parts, cs., 86
Wright, Peter & Sons, Mach'y, cs., 19
Order—Crane Mach'y, pcs. and pkgs., 68; cables, 4; Tires, 4; Forgings, 46; Locomotive Forgings, 12; for Zacatecas, Mach'y, pkgs., 30

## Coal Market.

The Coal trade is quiet in both departments, Anthracite and Bituminous. In the former the only feature is the weakness of steam sizes, Pea selling anywhere between $2 and $2.65 for the best Lehigh, according to quality, and Buckwheat is quoted $1.40 @ $1.90. In domestic sizes there is no business. The Bituminous trade is confined almost wholly to contracts. The Pool Seaboard Association price of $3.25 alongside is the minimum, indicating a firm market. As usual there is some range on the Clearfield production, varying with quality.

The last week's production was 860,000 tons; total production for year, 15,829,874 tons; excess over last year, 2,293,643 tons. Stocks of Coal tidewater have declined within a month 27,000 tons. Reading production 215,000 tons for the week. The Clearfield production for the week was 52,000 tons; Beech Creek, 42,000 tons; Cumberland, 81,000 tons. The Coke tonnage for the last week reachad 113,808 tons.

The official figures of the Bureau of Anthracite Coal Statistics gives the output for the month of May, 1891, at 3,399,534 tons, compared with 3,096,551 tons in May, 1890, and 3,016,531 tons in May, 1889.

## Financial.

The Executive Committee of the National Silver Association held a two days' session in this city with A. J. Warner of Ohio in the chair, and gave out an elaborate address favoring a bimetallic basis of currency. John Jay Knox published an intended answer both to the committee and to the argument of Senator Stewart of Nevada, in which he first denies that those in favor of the gold standard are opposed to the use of silver, and proceeds to show that there is already $100,000,000 more of silver than gold in the world's circulation, and yet that the latter is the recognized standard. "If the east," he says, "which contains 1,000,000,000 of people, prefers all silver and no gold, the West certainly, which contains only 500,000,000 of people, should have a right to prefer a gold standard—certainly, when it is the pleasure of the people of the West to use with the gold millions of ounces of silver in subsidiary coin. England, Germany and the United States to-day use more than $700,000,000 of silver coin and yet maintain the gold standard. The Latin Union also, which has long since closed its mints to the coinage of silver, but keeps them wide open for gold, uses $830,000,000 of silver coin maintained at the value of gold by the high credit of the French Government and of the Bank of France."

Mr. Knox proceeds to show that as silver advances in value foreign bullion will cross the ocean to realize the profits that can be made. Silver in this market on Friday, for the first time since February 14, reached $1 per ounce, and it is understood that a speculative pool in London was the moving force. Report says at a cabinet meeting in Washington on June 26 the subjects to engage attention will be the continued coinage of silver bullion and the final disposition of the question of extending the 4½ % bonds. Bankers in this city within the past week have been interviewed quite generally upon the questions at issue and with few exceptions favor the retention of the white metal in the form of bullion. The resumption of gold shipments to Europe was discouraging, but was counterbalanced by the excellent weekly bank statement, showing that the surplus reserve was larger than at any time in 1890, and more than double that of a year ago. Interior banks also are well fortified in cash, notwithstanding the recent heavy eastward shipments. The fact appeared that the new engagements are made at a loss, considering current sterling rates, but in such a consideration there is to be reckoned the premium which is still being offered in the matter of interest payment from the time the gold is shipped. Some of the foreign banks, it appears, still offer a premium in one way or another for American gold.

Bank clearings in 60 cities indicate a reduced volume of trade, there being a decrease of 11.2 % compared with last year. Outside of New York the decrease was 5.05 %. New York decreased 15 %, Boston about the same and Philadelphia a little more

Stocks have been generally lower. Influenced by the reduction in the minimum rate of discount by the Bank of England, the market for the railroad stocks opened

strong. New England was firm on a report that the directors have made provision to carry over the floating debt. Silver bullion certificates rose in consequence of a demand in London for silver for India, and also because of a rumor that the United States Treasury Department would order the coinage of the standard dollars after July, and Chicago Gas was active and generally stronger on news of a settlement with the city of Chicago. Later the market was unfavorably affected by the withdrawal of $2,500,000 gold for export to Germany. The publication of a statement showing that there was, for the first time in many years, an actual deficit in the United States Treasury—deducting from the $43,061,264 cash balance $23,627,411 held by the national banks and the fractional silver coin—attracted some attention, but it had no appreciable influence in the market. On Tuesday more favorable reports from London regarding the expected Muriettas failure, and the fact that no engagements of gold had been made for Wednesday's steamers, served to keep the market firm. A fall in silver was said to be due to realizations by the pool, indicating a collapse in speculation.

The failure of the leather house of Alley Bros. & Plate of Boston it was feared would have a bad effect upon the market for commercial paper by restricting purchases for Eastern account.

The bond market is stagnant. United States 4s are lower. Quotations are as follows:

| | |
|---|---|
| U. S. 4½s, 1891, registered | 100 |
| U. S. 4½s, 1891, coupon | 100 |
| U. S. 4s, 1907, registered | 117¼ |
| U. S. 4s, 1907, coupon | 118¾ |
| U. S. currency 6s, 1895 | 109 |

In State bonds there were sales of North Carolina consolidated 4s at 100½ @ 100, and South Carolina non-fundable 6s at 2½.

Saturday's bank statement showed the remarkable increase of over $11,000,000 in deposits, much of it coming in pension payments from the United States Treasury. Specie increased $5,000,000. The loans were expanded over $3,000,000, but the surplus reserve was increased $5,600,000 and now stands at $16,100,000, against $6,100,000 last year and $9,200,000 the year before. And this happens after sending over $60,000,000 to Europe. Money was easy. The market for commercial paper was a little more active, and in addition to the demand from out of town a few of the city institutions other than banks were in the market for paper. Rates were 5½ % for 60 to 90 day indorsed bills receivable and 6 to 7 for good single names. Banks are not yet ready to buy commercial paper with freedom, because the money deposited in the banks will be to a large extent withdrawn on or about July 1 for dividends and interest. It is estimated that the dividend and interest payments on July 1 in the cities of New York, Philadelphia and Boston will reach $112,000,000, in the proportion of $90,000,000, $10,000,000 and $12,000,000, respectively.

Warned by the recent collapse of two leading national banks in Philadelphia and the evidence that they were practically insolvent long before the fact was discovered by the National Bank Examiner, Colonel Lacey, the Comptroller of the Currency, has adopted a system of tests and instructions intended to make a new bank examiner thoroughly familiar with his duties and qualified to detect the tricks which dishonest bank officers sometimes attempt.

A distinct feature in the week is the rise in the price of silver, the advance being to $1.01 ℔ ounce. Director Leach of the Mint bought largely in the belief that a further rise is probable in prospect of increased demands for silver in India to pay for wheat. It was thought the rise in price of bar silver affected the wheat market here, yet cotton did not appear sensitive to the feature. In London bar silver was quoted 45¼d. ℔ ounce.

The merchandise markets are rather more satisfactory, and trade is supposed to amount to a fair average for the season. Among dry goods jobbers prices are steady as a rule. A few additional revisions in cotton goods are still looked for. The advance in silver awakens interest in the prospects of trade in cottons with Eastern markets.

Breadstuffs and grain are generally easier, wheat closing weak. Cotton is another point down, quotations being lower than before since 1847, good crop prospects operate against more favorable features from Liverpool. Hog products were depressed on large receipts. Coffee and tea receded in value.

The rapid increase in the number of trust companies in Brooklyn has stirred up the local banks to the necessity of doing something to retain their customers. The fact that the trust companies allow 2 % interest on all deposits and then permit checks to be drawn on these accounts operates to the disadvantage of other institutions.

Grain freight rates by lake, which have for some time been at a very low basis, were advanced, this being the result of the settlement of the ore handlers' strike at Lake Erie ports, which caused a brisk demand for boats.

## British Iron and Metal Markets.

[*Special Cable Dispatch to The Iron Age.*]

LONDON, WEDNESDAY, June 24, 1891.

Speculation in Scotch warrants has been quiet and prices have undergone little change. The only new feature is a rather better demand from London for forward delivery. At that center they seem to have adopted a waiting policy and little can be done in the absence of outside speculative interest. There has been some buying of Cleveland and Hematite warrants for outside account, on the strength of which prices moved up on Tuesday to 42/4½ and 51/9, respectively. Shipments of Scotch Pig are still light. There are now 69 Scotch furnaces in blast, but makers state that prices for Iron are unremunerative and production is running behind the consumption. The stock in Connal's stores is now 514,000 tons Scotch and 134,000 tons Cleveland. Today's trading in warrants was at 47/ @ 47/2 for Scotch, 42/ for Cleveland and 51/3 for Hematite.

The market for Old Iron is better. There is more inquiry from both home and export buyers, and stocks are very small.

A crisis is threatened in the Scotch Steel trade, owing to the closing down of Tin-Plate works. Smelters are now offering Steel Blooms at £5 per ton.

The Tin Plate market is dull and prices are unsettled. Ordinary Bessemers have been offered at 13/9. The steamer Servia, which sailed on Friday, took the last lot of Plates that will be shipped to the United States for entry at existing rate of duty, and the market is now settling down to the new order of things. Buyers are disinclined to enter into engagements pending the outcome. The stoppage of mills for one month will commence on Saturday next, when 44 works will close. Between now and September 26 others will probably cease work.

The Pig Tin market has been featureless. Prices are well maintained, the majority of the stock here is in strong hands and the consumption is good.

Copper has been fairly active and firm. Business chiefly in warrants for prompt and near delivery against late short sales. There is still a strong consumptive demand.

**Scotch Pig Iron.**—Makers' Iron finds slow sale and prices are without important change.

| | | | |
|---|---|---|---|
| No. 1 Coltness, | f.o.b. | Glasgow | 61/ |
| No. 1 Summerlee, | " | " | 59/ |
| No. 1 Gartsherrie, | " | " | 59/ |
| No. 1 Langloan, | " | " | 60/6 |
| No. 1 Carnbroe, | " | " | 49/6 |
| No. 1 Shotts | " | at Leith | 61/ |
| No. 1 Glengarnock, | " | Ardrossan | 59/ |
| No. 1 Dalmellington, | " | " | 58/ |
| No. 1 Eglinton, | " | " | 51/ |

Steamer freights, Glasgow to New York, 2/; Liverpool to New York, 10/.

**Cleveland Pig.**—The movement is slow but prices are firm, in sympathy with warrants. Makers quote 41/ for No. 3 Middlesborough, f.o.b.

**Bessemer Pig.**—There is no improvement in the demand, but prices are firmer, with 53/ asked for West Coast brands, Nos. 1, 2 and 3, f.o.b. shipping port.

**Spiegeleisen.**—A moderate trade passing and makers' prices as heretofore. English 20 % quoted at 95/ @ 97/6, f.o.b. shipping port.

**Steel Rails.**—Demand is very light and some makers offer at lower prices. Heavy sections quoted £4. 7/6, and light sections £5 @ £6, f.o.b. at N. W. England shipping point.

**Steel Blooms.**—Market remains very dull and rather weak. Makers ask £4. 5/ for 7 x 7, f.o.b. at N. W. England shipping point.

**Steel Billets.**—Sales small and the demand without improvement. Bessemer, 2½ x 2½ inches, quoted at £4. 10/, f.o.b. at N. W. England shipping point.

**Steel Slabs.**—Very little doing and former prices asked. Bessemer quoted at £4. 10/, f.o.b. at N. W. England shipping point.

**Old Iron Rails.**—Demand fair and holders asking somewhat higher prices. Tees quoted at £2. 17/6 @ £3, and Double Heads £3. 2/6 @ £3. 5/, f.o.b.

**Scrap Iron.**—The market very quiet, but prices steady. Heavy Wrought quoted at £2. 10/, f.o.b.

**Crop Ends.**—No change in these. Demand still very light. Bessemer quoted at £2. 15/ @ £2. 17/6, f.o.b.

**Tin Plate.**—Business slow and prices irregular and unsettled. We quote, f.o.b., Liverpool:

| | |
|---|---|
| IC Charcoal, Alloway grade | 15/6 @ 15/9 |
| IC Bessemer Steel, Coke finish | 14/6 @ 14/9 |
| IC Siemens " " " | 14/9 @ 15/ |
| IC Coke, B. V. grade | 13/9 @ 14/ |
| Charcoal Terne, Dean grade | 13/6 @ .... |

**Manufactured Iron.**—The demand not as good as last week, but prices steady. We quote, f.o.b. Liverpool:

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Staff. Marked Bars | | | | @ | 8 | 10 | 0 |
| " Common " | 6 | 7 | 6 | @ | 6 | 10 | 0 |
| Staff. Bl'k Sheet, singles | | | | @ | 6 | 17 | 6 |
| Welsh Bars (f.o.b. Wales) | 5 | 12 | 6 | @ | 5 | 15 | 0 |

**Tin.**—The offering freer at the close and prices weaker. Straits quoted at £92. 15/, spot, and £92. 5/ for three months' futures.

**Copper.**—Market quiet to-day, but prices firm. Merchant Bars quoted at £56. 7/6, spot, and £56. 17/6, three months' futures. Best Selected, £59. 10/ @ £60.

**Lead.**—Business fair and prices steady at £12. 12/6 for Soft Spanish.

**Spelter.**—Demand moderate, but market steady at £23. 12/6 for ordinary Silesian.

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The Baldwin Locomotive Works of Philadelphia are experimenting with oil for raising steam.

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It is reported that a Schuylkill Valley steel works will build a wire-rod mill.

# HARDWARE.

## Condition of Trade.

TRADE IS EVIDENTLY of only moderate volume throughout the country at large, business being confined principally to assorted orders and seasonable specialties. There is, however, the usual trade for this season, and the market, as a whole, is characterized by a hopeful tone, notwithstanding the rather unsatisfactory business for the past month or two. A number of Southern houses are at present in the market and unite in reporting an excellent condition of things, there being a good feeling in view of anticipated prosperity based upon the large cotton crop. Notwithstanding the low prices now ruling they are placing their orders for about the usual quantities. From other parts of the country the outlook for abundant crops at good prices is a point often alluded to as justifying the expectation of active business in the fall, especially in view of the fact that there has been during the past half year a quite general curtailment of expenditures and repression of enterprise, which will naturally be followed by a gratifying activity when the market assumes a more buoyant tone. In the matter of prices there has been very little change. There is some reported improvement in regard to collections.

### Chicago.

*(By Telegraph.)*

The demand for Shelf Hardware has been fair, but not heavy, having been confined mainly to sorting up orders. Houses dealing in specialties report a general slackening in trade, due to the approach of vacation season and the very hot weather which has prevailed in some sections. The demand for staple goods is light. Jobbers of heavy Hardware are not in accord as to the state of their trade, some houses reporting a diminution in orders, while others are still working up to their full facilities for handling business. Nothing special has occurred in the way of changes in prices, but the market on Carriage Bolts has been unsettled by the action of manufacturers outside of the association. While they cannot supply the whole trade they are fixing prices for it, to the annoyance of dealers who are obliged to buy from association makers.

### St. Louis.

*By Telegraph.*

Trade continues fairly satisfactory, taking into consideration the fact that the West has been flooded with rains for the past two weeks, making country business almost impossible. The demand for shelf goods is fairly active, and there is some business doing in Heavy Hardware. Wire Nails and Barb Wire are weak, and prices are shaded to very near the prices ruling three months ago. Cut Nails are slow to move at $1.80 per keg. Copper and Copper goods are in in good demand, and prices are well maintained. With the assistance of the crops a large fall business is expected, and jobbers are shaping their affairs so as to be in position to meet it. There is more or less complaint regarding collections.

## Notes on Prices.

**Cut Nails.**—The Nail market continues in decidedly sluggish condition, with but little to report. The demand is light and some of the mills are curtailing their production. Prices remain without change on the basis of $1.55 at mill for carload lots with a 25-cent average. The local demand is moderate, and small lots from store are held at $1.75 to $1.80.

*Chicago, by Telegraph.*—Steel Cut Nails have been in rather less demand the past week, but manufacturers' agents report no change in prices, quotations ranging about $1.70, Chicago, on 30-cent average. Jobbers are having a limited demand also and continue to quote $1.80 from stock.

**Wire Nails.**—In the Wire-Nail market there is comparatively little doing, though it is understood that some large buyers have been placing orders. There is no quotable change in prices, though some of the mills manifest an indifference to orders at the low prices ruling. During the coming month there will probably be some curtailment of production. Quotations are $1.95 to $2 for carload lots at factory, small lots from store being held at from $2.15 to $2.25.

*Chicago, by Telegraph.*—Some of the Wire-Nail manufacturers are tiring of the contest for trade, and have closed down to await developments. The others are trying to advance prices. They are not disposed to enter contracts beyond June at present rates, and ask $2.05 at mill for July. Jobbers are still selling at $2.15 from stock, but if manufacturers' prices should advance they will be likely to put up rates also.

**Barb Wire.** — Manufacturers report business in small volume. There is still some complaint of slight irregularities in price, but these are supposed to come principally from cutting by the jobbers who hold low priced stocks. The trade are awaiting with interest the developments of the next month or two. Quotations are still on the basis of $3.50 for Four-Point Galvanized and $2.95 for Painted, with the regular abatement of 10 cents for carload lots and 5 cents for jobbers and railroads; terms 60 days, or 2 per cent. discount for cash in ten days, with delivery at leading points.

*Chicago, by Telegraph.*—The condition of trade is not satisfactory. Both manufacturers and jobbers report a light demand, with $2.75 rates ruling on Painted in less than carloads.

**Padlocks.**—The manufacturers of Padlocks, whose advance was noticed in our last issue, have issued their revised lists. The new prices are understood to be maintained firmly, and as the advance was unexpected, very few orders were booked in anticipation of it.

**Cordage** —There has been no change in the situation since our last report, the market being without improvement as yet, and the active competition between the National Cordage Company and the outside manufacturers continuing. The acquisition by the National Cordage Company of the Canadian mills is regarded as strengthening their position. The manufacturers' price for large lots of Manila Rope is now 9 to 9¼ cents and for Sisal 6¼ cents. Prominent jobbing houses in the West are selling Manila in small parcels at 9¾ cents and Sisal at 6¾ cents.

**Glass.**—While no official information has been received as to the action taken by Glass manufacturers and jobbers at the meeting held in Chicago on the 16th inst., it is generally understood that manufacturers' prices were reaffirmed, and that jobbers will advance prices from 5 to 8 per cent. Jobbers have to a great extent been selling at manufacturers' prices on stocks purchased some time ago. If there is any real scarcity in Glass it will show itself during the next two months, as all the fires will go out of blast about June 30. Prices were reaffirmed on imported Window Glass at the meeting held in Boston on June 19. Local trade is quiet. Quotations on Glass are unchanged, as follows: American Window Glass, for carloads, 80 and 10 per cent. discount; less than car lots, 80 and 5 per cent. discount; French Window Glass, 75 and 10 and 5 per cent. discount, with an additional 5 per cent. discount when 50 boxes are ordered and taken in any calendar month. American Plate is held at discount 50, 10 and 5 per cent., and Imported Plate at discount 60 per cent.

**Loaded Shells.** — The market for Loaded Shells is in substantially the same condition as at our last review, except that the Peters Cartridge Company, Cincinnati, Ohio, for whom J. C. McCarty & Co., 97 Chambers street, New York, are agents, have withdrawn outstanding quotations and announce revised prices in a circular from which the following extract is taken:

Being governed by the law of supply and demand, and not wishing to disappoint our customers by holding out inducements both as to price and quantity that cannot reasonably be fulfilled, we deem it expedient to withdraw all quotations, either expressed or implied, on Loaded Shells, and beg to state that our lowest prices from this date and until further advised will be: For less than 50,000 a discount of 40 and 10 and 5 per cent.; for 50,000 and over in one order and shipment, 40 and

10 and 10 per cent., all f.o.b. Cincinnati, 60 days or 2 per cent. cash ten days. Will state in this connection that any obligations assumed by us, whether profitable or otherwise, will be carried out to the letter, subject to customary restrictions of unavoidable accidents.

The above prices are for Cincinati, Chicago or St. Louis delivery.

Since the announcement of revised prices by the associated manufacturers, business in Loaded Shells has been active and a great many orders have been booked. The indications that scarcity will be experienced during the coming season still hold, and make it to be the part of wisdom for merchants to cover their prospective requirements in order to avoid delay and annoyance later.

**Knife Sharpener.**—The following are the list prices of the American Knife Sharpener, which was illustrated in our last issue, as manufactured by Mossberg Mfg. Company, Attleboro, Mass. The list is subject to a trade discount of 50 per cent.

| | |
|---|---|
| 1 dozen by express | $ 2.70 |
| 6 dozen by express | 15.00 |
| 12 dozen by express | 28.00 |

## Trade Items.

DUNNE CUTLERY COMPANY, 102 Milk street, Boston, are calling special attention to the Rex Axle Grease, for the sale of which they are agents. They state that by a peculiar process of manufacture this Grease has great smoothness and endurance and will run a vehicle of any kind over 200 miles with one application. The fact that it never gums or runs out, is not affected by heat or cold and that it prevents an axle from heating are among other points mentioned as justifying their claim as to its superior quality.

THE GOLD MEDAL awarded by the recent international exposition held at Jamaica, W. I., for the best exhibition of Silver Plated Flat Ware, has been given to the Holmes & Edwards Silver Company, Bridgeport, Conn. The exhibition included their latest and best manufacture of Sterling Silver Inlaid Spoons and Forks, regular Plated Ware and solid metal goods. As this company came into active competition with the best of English, German and Spanish Spoon manufacturers, it may be considered complimentary to American industry that the medal was thus awarded.

IN THE DESCRIPTION in our last issue of their Hub-Boring Machine the address of Butts & Ordway was referred to as 145 and 147 Pearl street, Boston. This was their former address, the correct one being 498–502 Atlantic avenue, to which point they removed some time ago.

G. A. MASON, who has represented the HP Nail Company, Cleveland, Ohio, for the past 10 or 12 years, and who is accordingly especially well known to the Hardware trade, was married last week in Cleveland to Miss Anna Black.

WINCHESTER REPEATING ARMS COMPANY, New Haven, Conn., announce that to meet the large and increasing demand for a good Gun Oil or Grease, they have prepared and are now ready to offer what they consider a very meritorious composition, known as Winchester Gun Grease. The company state that this article is absolutely free from acids and is a positive rust preventive. Their long experience with the Grease in their armory has convinced them of its excellence, and they recommend it to all owners of Rifles, Shot Guns and Revolvers and to the trade in general. The manufacturers state that a light coat of this Grease on any bright metallic surface will not only prevent it from rusting or corroding, but preserve its original finish and luster. The Grease is put up in collapsible metal tubes of one size only, packed in a neat wooden box containing ten tubes.

MILLER BROS. CUTLERY COMPANY, Meriden, Conn., are making a large brick addition to their works, the cost of which will be in the neighborhood of $20,000. This addition will largely increase the capacity of their Pocket Cutlery and Steel Pen departments. When completed the company hope to have one of the best equipped Pocket Cutlery factories in the world. They advise us that they will continue to make additions as fast as the rapidly growing demand for American Pocket Cutlery warrants it, the McKinley bill having helped the business materially, thus requiring largely increased production.

A CHANGE HAS OCCURRED in the style of the Cleveland Wheelbarrow and Truck Company, Cleveland, Ohio, which has become the Cleveland Wheelbarrow and Mfg. Company. The retirement of E. F. Wright, as secretary and treasurer, is also to be noted. J. W. Hornsey is Mr. Wright's successor. The company refer to business as exceedingly good, and will increase their capacity.

UNDER DATE JUNE 7, J. Boschken, San José, Cal., announces that he has sold his stock of Hardware to Miner & Van Sant, who will continue to conduct the business. In retiring from the business which he has so long carried on Mr. Boschken gracefully thanks the public for the very generous patronage received, and cordially recommends his successors. Henry Boschken will continue with the new firm.

JAMES W. LYON, manufacturer of Metal Novelties and Steel Screws, has removed from 11 and 13 Dunham place to the spacious five-story brick factory located on Lexington avenue, between Reid and Patchen avenues, Brooklyn. Mr. Lyon has been engaged in the above line of business over 40 years, and is the patentee and inventor of several articles pertaining to his business.

ATTENTION IS DIRECTED to the Eclipse Nail Puller, an advertisement of which appears on another page of this issue. This Puller has many features mentioned by the general sales agent, which will commend it to the trade. Among these claims are noticed that it is nearly noiseless in operation; that it will not cut the hand of an operator; that it centers itself upon the nail and has anti-slip jaws; that it has a strong and most perfect rivet, and that there is no bursting strain on the pivot. The Puller has no springs; the steel parts are composite plated, giving a white finish. These goods are being introduced through the Hardware jobbers.

CLEVELAND HARDWARE COMPANY, Cleveland, Ohio, whose factory and mill were destroyed by fire on June 6, announce that they have a complete stock of goods on hand in their fire proof warehouse, which will enable them to fill all orders as usual. They have completed preparations for starting their manufacturing plant in temporary buildings, and will be running full capacity in a few days. Work on the company's new buildings will be started at once, and they hope to erect a plant more suited to their constantly increasing business than they have heretofore had.

MCKINNEY MFG. COMPANY, Allegheny, Pa., are sending out leather covered, gilt edge, vest pocket memorandum books, in which attention is called to their Steel Hinges. In their extensive works they have the facilities for making a full line of Strap and T Hinges and Butt Hinges of every description. The company refer to the quality of steel used in the manufacture of these goods.

U. J. ULERY, New York manager of the Clauss Shear Company, 100 Chambers street, is again at his desk, having returned from his wedding trip, which has occupied his attention since June 3, when, at Toledo, Ohio, he was married to Miss Arletta Lucine Burchfield.

WELLS & NELLEGAR COMPANY, Chicago, Ill., in connection with price current of season goods give the open season for game and fish in a large number of States, This covers moose, deer, caribou, geese and ducks, grouse, quail, rail, plover, trout, salmon, bass, rabbits, squirrel, woodcock and turkey. They state that the dates given are the latest general State laws, and that many towns and counties have local laws that differ slightly from these.

WITH REFERENCE to the litigation in regard to infringement of Meat Chopper patents, William J. Lloyd Mfg. Company, Philadelphia, write us as follows: "Public attention has been extensively called to the recent decision in the suit of the Enterprise Mfg. Company with Deissler & Wannamaker, in which the Meat Chopper patent owned by the plaintiffs have been again sustained by the United States Courts. To prevent misunderstanding in the trade, we desire it to be known that the Great American Meat Chopper is protected by the patents thus sustained, we having settled our suit with the owners and taken a license from them for our machine."

## "No Time to Read."

BY A. F. G.

A HARDWARE merchant remarked to the writer that he had no time to read; that he did not read a daily paper from one week's end to another. In looking over his stock evidence was not lacking of an absence of new ideas and progressive push. The show windows were not attractively arranged; the goods in them were seasonable, but were so crowded that no agreeable impression would be produced on the mind of a passer by. The goods on the shelves did not have their best foot forward, but had a discontented appearance, as if ill at ease. Shovels and Spades leaned languidly against the ledge in inelegant repose, instead of being hung up in order with an eager expression on their bright faces as if desiring to be put to work. The Scales sulked in a corner on the top of a Nail keg, near which stood some perspiring Snow Shovels. No, business wasn't good; just kept from starving by taking things to repair, like Electric Bells, Clothes Wringers, Locks, and so forth.

An Iowa Hardware merchant once said that whenever he got to Chicago he could not help but walk straight with his shoulders well thrown back and his head up. The merchant who keeps abreast of the times and up with new ideas by reading such a paper as *The Iron Age* every week can't resist the breezy, stirring influence that is derived from it. He will not be satisfied to have his Wire Cloth in an indiscriminate heap on the counter, but will build for himself a "Hardware Charlie" Screen Wire rack. An Underhill, Clinch & Co.'s

Steel Goods rack will take the place of a barrel that has heretofore held the Hoes and Rakes. Dusty Cross-Cut Saws which have stood in the corner by the Bolt rack in confusion will be nicely arranged in a Basche & Co.'s Rack, and other things in the store will be brought up in appearance and order to an equal level. He will also know that there is a new list on Padlocks; that there are some signs of irregularity in Wood Screws or that Nails are begging for customers and that it is the right time to buy. He may discover that American Tin Plates are being sold by the pound, or that a brick-lined Soldering Furnace is better than his home made Charcoal Fire Pot. The advertisements in his paper will tell him who manufactures the goods he has been buying of jobbers; and if he desires information on some point doubtless the editor would furnish it in response to an inquiry and a 2-cent stamp. The knowledge gained week by week from a careful perusal of such a paper cannot fail to put the merchant far in advance of his competitor whose time is too valuable to be spent in reading.

## Trade Topics.

**Selling to Consumers.**—With reference to this matter, which is apparently at present receiving a good deal of attention throughout the trade, we have the following letter from a Hardwareman in the northern part of New York State:

I see by your issue of June 11, under head of Selling to Consumers, a letter from a Maryland merchant. It covers my experience exactly. Last week I had an agent of a rubber goods company ride with me for three or four days through this section of the country, and he sold to saw-mill men, hotel keepers, and, in fact, any person, any quantity wanted, down as low as 10 feet of 1 inch 2-ply hose, for 90 cents, or 9 cents per foot, and to one mill man he sold a side of string or lace leather. Would like to see this thing stopped as it is killing to any merchant.

**Cost of Freight.**—In reply to the inquiry of R. C. S. in a recent issue we have received the following from an experienced Hardware merchant in the South:

We find that the only satisfactory way is to weigh each class of goods and add to it the cost per pound it takes to bring it in, allowing in our weight a percentage of the weight of case, so that each article pays its share of said case. This is the only true mode of getting cost with the different classifications made by railroad companies. If charge for package is made see that each article carries its per cent. of the cost of same, throwing drayage in with package, unless you have arranged by the hundred, in which case add it to the freight rate.

**Quantity Discounts.**—The question as to how to regulate prices so as to give equitable protection to the large trade, and at the same time meet the reasonable expectations of retailers, is not any easy one, complicated as it is by the fact of so many conflicting interests. A Southern house makes the following suggestion:

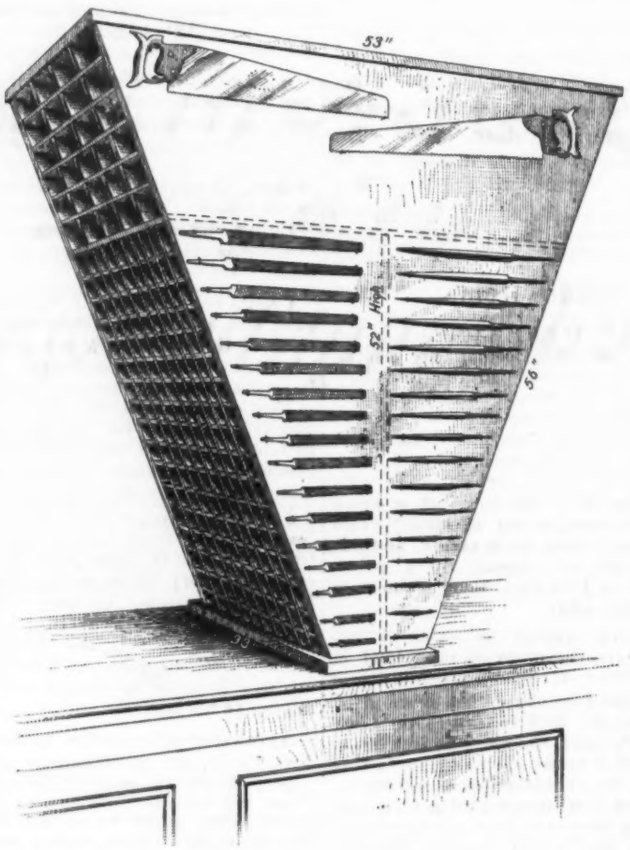
Trade would be more pleasant if manufacturers would lower their quantity discounts so that a few large jobbers could not control certain lines to the exclusion of regular and smaller trade.

**Employees.**—From a Hardware house in Maine we are in receipt of the following suggestion:

A few articles in your paper about the value of salesmen to their employers would not be amiss. The prevailing ambition appears to be to swell their sales without regard to profit, and we attribute the cutting of prices, both for the manufacturer and jobber, to these men.

## File and Saw Rack.

N. J. NEWTH, Ilion, N. Y., sends a description of the File and Saw rack illustrated herewith, as of interest to the trade. He has used it in his store for a number of years, and finds it convenient for handling a large assortment of Files to retail from, economical of room and easily kept clean. The base upon which all is built is of 1-inch stuff, 11 x 33 inches in size, which is the counter space the rack occupies. The rack proper is 9 inches at the base and 53 inches at the top. The side pieces are ⅞ inch thick, and the divisions ½ inch thick. Its full hight on the base is 52 inches, so that when standing on a 34 inch counter a man 5½ feet tall can easily reach the Saws in the top row of holes. There are 130 pigeon holes on each side for Files and 27 apartments for Saws. The rack will hold on one side all sizes of Files from 2 to 14 inches as follows: Mill Bastard, Half-Round Bastard, second cut and smooth; Hand Bastard, second cut and smooth; Flat Bastard, second cut and smooth. On the other side it will accommodate Taper Files, Three-Square Bastard, second cut and smooth; Round Bastard, second cut and smooth; Square Bastard, second cut and smooth. The pigeon holes for Files are uniform in size, except the three lower rows, which are used for small Files. Most of these will hold 1 dozen Files in their original boxes. The center division, running up and down, is painted white, with the length of Files in the various rows designated by black figures. The top pigeon holes will accommodate all Saws from 18 to 28 inches in the regular sizes, leaving plenty of room for Meat, Back and Compass Saws. The top of the rack is utilized for keeping unbroken boxes of Saws and Files. The rack is firmly put together, being nailed and glued, and the base is bolted to the counter. The rack being larger at the top than at the bottom, saves counter space and allows but little dust to settle on the goods. Our readers will appreciate the suggestions which this rack offers as a convenient and compact method of arranging goods.




*File and Saw Rack.*

## Retail Hardware and Stove Dealers' Association.

A MEETING of the Hardware and Stove Dealers' Association of New York and Vicinity was held on the 10th inst., at which several new members were enrolled and good reports received as to the feeling in the trade. Henry Metzinger was elected financial secretary. The next meeting is to be held at 213 East Twenty-third street, New York.

## Brush Marking.

BY C. S. WADY.

VERY office man has doubtless at one time or another during his business experience had occasion to letter or mark with a brush, and if he had no knowledge of that branch he has often regretted the fact. Now the particular lettering to which I have reference is the simple marking of cases with the address, &c. If badly done, few things look worse; if fairly done, it looks well; if perfectly done, nothing is more satisfying to the artistic eye. The amount of practice required to gain a fairly good command of the marking brush is not large, provded one will do that practicing intelligently. The best way is to get a good, plain alphabet, and "pick it to pieces." With a view to getting something practical, I visited the "den" of a brush marker and secured a copy of his alphabet, Fig. 2, as he produced it off hand, He also gave me the numerals, Fig. 3. These are reproduced here as models from which to work, pending the appearance of anything better or more to the reader's particular fancy or requirements. As hinted before, it is not offered as something of copper-plate perfection, but the writer thinks it practical, and it is in use.

Analysis of the construction of these letters will show that the first thing to be done in making them is to build a frame—the same being true of every kind of construction. The frame in this case is really an outline, Fig. 4, and in drawing the brush along, the outside edge of the brush is the one to watch, to see that a clear, clean line is being produced. The filling in is done after this.

The copy should be studied for a time, that a mental photograph of the outline may be taken, so to speak, in the eye, which will be an aid in guiding the hand.

The best brush to use for the purpose is what is known as No. 4 Super Round Artists', costing 15 cents singly, or $1 per dozen. Do not get hair; the fresco (long hair) is suitable for cardboard work, but for marking on wood the brush should be of bristle, and have, as described, round points.

A hand is illustrated in Fig. 5 which was done with the kind of brush recommended here, as were the originals of all the figures shown.

Master this alphabet, caps and small letters, and the numerals, and you are prepared to do some very nice work, and it is more than likely that you will not be content with the acquisition of such limited amount of knowledge touching this interesting subject, but desire to get other alphabets, and possibly originate something yourself. Books are published with examples of various styles of alphabets, but if you can get them from the brush of a practical marker, do so.

*Fig. 4.—Analysis of Construction of Letters.*

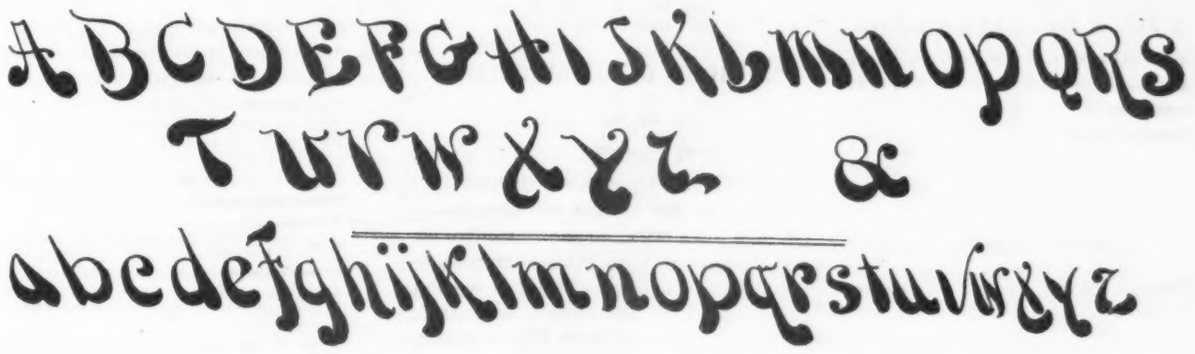


*Fig. 2.—Reduced Fac-Simile of a Brush-Marker's Alphabet.*

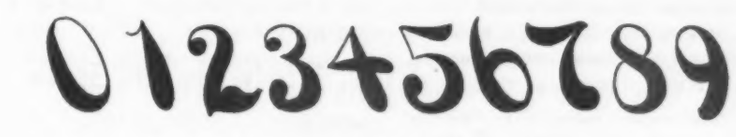


*Fig. 3.—Brush Marker's Numerals.*

And right here I desire to ask, will not some of the many shippers who read this article, and who have a pet alphabet which they think "can't be beaten," brush it for the benefit of others and send a good, clean, black copy to *The Iron Age?*

*Fig. 5.—Index Made with Marking Brush.*

## A Word to Young Salesmen.

BY A. F. G.

THERE IS APT TO BE too little attention paid to the knowledge and qualifications necessary to become a good and popular salesman, especially among young men. The most important thing upon entering a retail store is to become acquainted with the customers. Almost all people have their peculiarities, and the salesman must become thoroughly familiar with each. Respect must be paid to their likes and dislikes, their whims must be humored; uninteresting recitals relating to unsatisfactory goods that they purchased some time before, or about something that was bought at "the other store," and proved the best they ever had, must be listened to with interest.

The knowledge of goods and prices, both the selling and cost, must not be left to be absorbed in the regular course of business experience, but especial study and continued searching should be persisted in until all the details are mastered. While the Hardware business can never be wholly learned, because something new is continually being put upon the market, there is a possibility of learning everything connected with your business up to date; and then to keep up with the times. New lines of goods are continually being introduced into the Hardware business, prominent among which at the present time Bicycles and Electric goods may be mentioned. There is no reason why the young salesman should not be the authority in the store on these or other new goods. You will be surprised at the amount of knowledge to be gained on any subject by devoting an hour or even a half hour a day to it. You will soon be better informed on the subject under consideration than the majority of people are. It is not enough to be well informed about the goods carried in the store, but it is desirable to know of other makes of the same kind, which is the best, and what particular advantages one make has over the others. Very few proprietors object to their clerks examining the invoices of goods purchased, or to their making use of catalogues and price-lists.

Promptness in getting to business in the morning, as well as in getting back from meals, will not only place you high in the esteem of the firm, but also educate one to promptness through life. Balls, picnics and running around nights with the boys unfits one for the next day's work, besides taking the mind from business. When not waiting on customers do not cultivate the habit of lounging about the front door, or sitting on the counter, but straighten up stock and keep the store in good shape. While not being forward, always accept any responsibility that comes in your way, and you will soon find that others will be intrusted to your care.

Don't forget; you are not paid to do that, but by attending promptly to the duties

assigned you will be regarded as one on whom reliance can be placed. Be pleasant and obliging, both to customers and to those with whom you work, if you desire to be popular and successful. These are but a few of the suggestions which might be made in the line of attaining high-water mark; but they are not beyond the reach of any young man starting out to make a place for himself in this busy world.

## Stock and Time Card.

THE CARD given below will probably interest some of our readers, providing as it does a simple and efficient means for the entering of workmen's daily reports in a common jobbing shop:

STOCK AND TIME CARD.
S. W. Damon, New Britain, Conn.
Date. 1891.
Job For.
Stock Used.

Time. Hours.

## Price-Lists, Circulars, &c.

RHODE ISLAND HORSE SHOE COMPANY, Providence, R. I.: Perkins' Horse and Mule Shoes, and Improved Toe Calks. Illustrations are given of their Toe-Weight Shoe; Medium; Road, Trotting or Snow Shoe; Mule, Cow Boy and Steel Shoes. Also of Perkins' Toe Calks, medium and long, blunt and sharp. Attention is directed to the Good enough pattern Horse and Mule Shoes, which they make in three different styles; the Army, with three calks and a thin heel; the Heavy pattern, with five calks, and the Winter or sharp pattern, made from steel, with five calks.

WRIGHT & COLTON WIRE CLOTH COMPANY, Worcester, Mass.: Power-Loom Wire Cloth and Galvanized Nettings, used for cotton dryers, locomotive spark arresters, fanning mills, foundry riddles, fruit evaporators, sand screens, wire lathing, &c.

ORR & LOCKETT HARDWARE COMPANY, 184 and 186 Clark street, Chicago: Catalogue of Contractors' Supplies. This is a 14-page pamphlet, with neat paper cover, giving illustrations and price-lists of such goods as Wheelbarrows, Shovels, Spades, Picks, Mattocks, Crowbars, Wedges, Jack Screws, Hoisting Wheels, Tackle Blocks, Ventilators and Thimbles, Registers, Sand Screens, Hods, Axes, Rope, Grindstones, Lanterns, &c. The Cut Nail and Wire-Nail schedules of extras are also given. The classification of goods as made in this catalogue will prove of great convenience to a large class of buyers.

THE HOLMES & EDWARDS SILVER COMPANY, Bridgeport, Conn.: Bulletin No. 6 for June. In this they remark: In hot weather, Fans for the outside, Sodas, Ices, Cream, for inside. In anticipation of a hot summer they call attention to their goods adapted for use at this season. Among others are their Ice-Cream Soda Spoons, Lemon Knives, Columbian and Delmonico Bar Spoons.

HAGEN & REID, Troy, N. Y.: Hardware Specialties — The Trojan Nail Puller, Reid's Little Wonder Tack Puller and Priam Tack Pull No. 1.

GLAUBER BRASS MFG. COMPANY, Cleveland, Ohio: Glauber's Hose Strap. This is described as being made of one single wire, and as being easily applied. These Hose Straps are guaranteed not to break or snap while fastening.

FRANK E. FITTS, 74 and 76 Pearl street, Boston: Railroad, Steamship and Mill Supplies. Leather and Rubber Belting, Hose, Tubing, Packing, Oilers, Waste, Rubber Carpeting and Rubber Matting, Ash Cans, Fire Buckets, Mill Baskets, Water Gauges, Barrows, Files, &c.

THE MALLORY-WHEELER COMPANY, New Haven, Conn., and 64 Reade street, New York: A revised price-list of Padlocks and Padlock Keys. They announce that their discount on Padlocks and Padlock Keys is 50 per cent. net cash. An additional discount of 2 per cent. may be deducted if bills are paid within 30 days of their date. These prices cancel and withdraw all their previous quotations.

## Methods of Circularizing.

BY A. F. G.

IT IS INTERESTING to look over a budget of circulars, which have been retained because of some particular feature in each. An object sought in modern circularizing is to have the matter pungent and effervescent; or to have the wording or appearance of the circular so striking that it will produce more than a passing impression on the reader's mind, and perhaps escape the waste basket. Upon opening a pasteboard box, which was received by mail, we find that Mechanics' Supply Company, Quebec, some time ago sent out a decorated Tin Horn, about 4 inches long. A circular in the same box contains the following, to their patrons:

*Being somewhat modest in regard to the blowing of our own horn, we presume our patrons and friends will not object to give it the necessary toot, suggesting that they would note (musically) that while the quality of our goods is very high, our prices are, at all times, exceedingly low.*

*We take this opportunity to thank you for past favors and trust you will continue, during the new year, to extend to us your valued support.*

Preceding the words "high" and "low" are bars of music, with very high and low notes. They also recall the old saying, "He that tooteth not his own horn, the same his horn shall not be tooted."

The Ellrich Hardware Mfg. Company, Plantsville, Conn., send out a pamphlet, entitled "What They Say," containing letters from various parts of the country regarding the Eclipse Spiral Screw Driver. The pages introducing the letters are headed as follows:

AN INDIANA MECHANIC SAYS:
PENNSYLVANIA RECOMMENDS IT.
GIVES PERFECT SATISFACTION IN IOWA.
A FEW WORDS FROM NEW JERSEY.
MICHIGAN WOULD NOT PART WITH IT.
NEW JERSEY HAS THE FLOOR AGAIN.

Terwilliger & Peck, New York, printers, designers and engravers, send a postal card 6 x 9 inches on which are eight pictures of one and the same pug dog with glasses, arranged across two ends and down one side. The other side is devoted to an expression of the pugs, which reads—from the bottom of the card up—"We are looking for your orders, your trade." Through the center of the card the following is printed in red and black:

This does look rather
Pug-nacious, but we
are fighting for your
trade, and mean to have
it if
promptness, best work
and fair prices have
the magnetism to
draw it.

Crane Bros. & Co., Yazoo City, Miss., have a cardboard folder, the covers of which are ornamented with two of Prang's delicately colored landscapes. On the inside are printed these injunctions:

DON'T FORGET
That we want to do all the business possible with you in 1891.

DON'T FORGET
That we are better fixed than ever to please you in both prices and goods.

DON'T FORGET
That each year has marked an increase in our business and a reduction in our prices on a basis that we can afford to do with less profit in a large business than it is possible to do with in a small one.

DON'T FORGET
That we are the only carload buyers of Plows, Cultivators, Barb Wire, Nails, Sash, Stoves, Wagon Material and Handled Hoes in this section of the country, and handle other goods in our line in such quantities as to meet the prices of any house in the South, saving you largely in freights.

St. Louis Stamping Company send an envelope containing gummed paper letters to make the sign Granite Iron Ware. These are to be used on windows, doors, showcases or mirrors. They suggest the advisability of placing these letters in a conspicuous place, and will send one or more of these signs if the merchant has suitable places for more than the first one sent.

The Binghamton Wagon Company, Binghamton, N. Y., send the following typewritten letter to a customer:

Let us help each other; that's business sense. We sell as low as we like; so do you; that's practical sense. We save you money; that's economical sense. Let us keep up correspondence; that's common sense. Why not do business together? That's dollars and cents.

Two pages are devoted to extracts from letters, which are headed: "Many Men of Many Minds, but All of One Mind as Regards the Eclipse Spiral Screw Driver." The back cover has "What we say: That no Hardware dealer that has an eye to business can afford to be without The Eclipse in his stock. If you agree with us write for price."

## It Is Reported—

That Joseph Mossiman will build a Hardware store in East Peoria, Ill.

That A. L. Nichols has purchased the interest of John A. Meeker in the Hardware business at Norwood, N. Y.

That Kleinfeldt & Schmidt's Hardware store at Elkader, Iowa, was the scene of a fire on the 15th inst. The stock was badly damaged, but is insured.

That N. K. Millett, Hardware, Corinth, N. Y., has sold out his business to Rhodes Bros., who have taken possession.

That the McMaster Hardware Company, Springfield, Mo., have been incorporated, the capital stock being $30,000. The stockholders are C. J. McMaster, W. H. Howard and J. J. Battson of Springfield, and S. Rogers, formerly of Humboldt, Iowa.

That Irwin Russell will open a Hardware store at Anson, Maine, in a few weeks.

That F. A. Luther will start a branch Hardware store at Redlands, Cal.

That Hayward & Finson, Ashland, Maine, are preparing to add a tin shop to their Hardware business.

That F. G. Fraser has embarked in the Hardware business at Beaverville, Ill.

That C. R. Stephens is the proprietor of a new Hardware and Agricultural Implement establishment at Anthony, Kan.

That J. W. Campbell succeeds the firm of Fishel & Campbell, dealers in Stoves, Tinware, &c., Aspen, Col.

That Lewis & Dougherty, Three Rivers, Mtch., have recently started in the Hardware business at that point.

That burglars broke into J. Davis' Hardware store at Perrysburg, Ohio, on the 15th inst. and stole $30 worth of goods.

That the Hardware store of Shaw & Kent, Emmetsburg, Iowa, was robbed on the 16th inst. About $250 in cash, Revolvers, Razors and Silverware were taken.

That J. A. Winters & Son, Midway, Pa., have commenced the Hardware business.

That the firm of Tallman & Strube, Grinnell, Iowa, is now Tallman & Gadd, Mr. Strube having sold his interest to Mr. Gadd.

That W. C. Kruger is building an addition to his Hardware store at Newberg, Ore.

That F. H. Coolidge, Hardware, Arlington, Vt., has been burned out.

That the firm of Gore & Morris, dealers in Hardware &c., Pine Bluff, Ark., have dissolved, Mr. Gore retiring. Mr. Morris will continue the business.

That R. H. Crippen is the proprietor of a new Hardware store at Tonawanda, Pa.

That the Capelle Hardware Company of Wilmington, Del., have been given the contract for supplying the United States Treasury Department at Washington with Hardware for the coming year, beginning July 1.

That the Woodruff & Weiser Hardware house of Gallatin, Mo., was burglarized on the 14th inst. and $50 worth of Pistols and Cutlery abstracted.

That Lafayette Smith has commenced the Hardware business at Waymart, Pa.

That a three-story annex to the wholesale Hardware establishment of A. Doherty & Co., Baton Rouge, La., is now in progress. With this addition Doherty & Co. will have one of the largest establishments in the State. The enlargement has been rendered necessary by the increased business of the firm.

That Edward Mulvihill has sold out his interest in the Beyer Hardware Company, Colorado City, Texas.

That F. Garner has purchased the interest of E. E. Diefenbaw in the firm of Diefenbaw & Dikeman, dealers in Hardware, Stoves. &c., Farmington, Ill. The new firm name is Dikeman & Garner.

That Thomas N. Murphy has commenced the Hardware, Stove and Cutlery business at Sprague, Wash.

That A. V. Davis will move his stock of Hardware to the store recently vacated by J. D. O. Truitt, Pocomoke City, Md.

That S. Gardiner will open a Hardware store at Wiota, Iowa.

That W. W. Funge is moving his Hardware store into the Stayner Block, Ogden, Utah.

That W. H. Davis will soon open a Hardware store in Michigan City, Ind.

That Shepard & Walker, Oaktown, Ind., will put up a large brick addition to their Hardware and Implement store

## Prices, Up or Down?

BY A. F. G.

SHALL A MERCHANT advance or reduce prices on goods in stock as their market value may change? This is an interesting question, particularly for merchants in the smaller towns, where they have one or more competitors. Jobbers advance or reduce prices on goods as the market changes. Manufacturers advance or reduce prices as the condition of the market or the price on raw material changes. Jobbers and manufacturers as a class are successful in business, so the rule would appear to be a good one for retailers to follow. But to return to our question: If, for instance, I bought a line of goods at prices that were unusually low, and by the time they were delivered the price had advanced 25 per cent., would it be better to make the selling price conform to present cost, or to make a leader of the goods and rush them off, ignoring the rise in the market?

If the goods were rushed off in a hurry it would no doubt attract temporary custom, but when the supply was exhausted the same goods could not be replaced except at an advance. As long as the goods lasted the low prices would doubtless worry my competitor, but my object is to build up my business, not to break down his. If, on the other hand, the goods in question had declined after mine had been bought, and my competitor had bought at the lower price, I should have had to lower my price to meet his. The fact that a merchant often has to follow the downward tendency of the market is an argument in favor of his taking advantage of an upward tendency and realizing larger profits. If he is obliged to drop his price to meet competition let it be done quickly, and to all customers alike. Do not fear your competitors, but if there is money to be lost lose it in a week, rather than in ten weeks. Prompt action on your part will show that you intend to meet any price that is necessary to hold your trade, and it may be that one lesson of this kind will be all that will be required. I should advise a close and continous scrutiny of the tendency of the market and a revision of prices of goods in stock to conform to such changes.

## Exports.

PER BARK STORKEN, JUNE 5, 1891, FOR PORT NATAL, SOUTH AFRICA.

*By Corner Bros. & Co.*—18 dozen Tools, 16 cases Agricultural Implements.

*By Arkell & Douglas.*—23 cases Plows, 100 reels Wire, 36 cases Plows, 6 Plows, 1 Churn, 1 Washing Machine, 56 Plows, 6 Shellers, 760 pounds Sash Weights, 14 cases Plows, 12 Saws, 4 dozen Axes, 3¼ dozen Brushes, 1 Churn, 2 Freezers, 8 dozen Fruit Jars, 17 cases Hardware, 11 cases Fruit Jars.

FOR DELAGOA BAY.

*By Arkell & Douglas.*—565 pounds Rope, 50 dozen Axes, 16 Plows, 6 dozen Sad Irons, 63 pounds Cord, 8 cases Weights, 12 dozen Barrows.

PER SHIP FALLS OF FOYERS, JUNE 6, 1891, FOR MELBOURNE, AUSTRALIA.

*By W. H. Quinn.*—585 pounds Fly Traps.

*By W. & B. Douglas.*—4 packages Pumps.

*By Peck, Stow & Wilcox Company.*—26 boxes Tinners' Tools.

*By James McEwan Company.*—11 cases Hardware.

*By Sherman & Lyon.*—3 cases Hardware.

*By Bradley & Hubbard Mfg. Company.*—3 packages Lamp Goods.

*By Henry Disston & Sons.*—6 cases Hardware.

*By Manhattan Brass Company.*—6 cases Brass Goods, 5 cases Hardware, 1 case Brass Goods.

*By Simpson, Hall, Miller & Co.*—15 casks Britannia Ware.

*By Edward Miller & Co.*—40 packages Lamp Goods.

*By Meriden Britannia Company.*—20 packages Plated Ware, 13 packages Plated Ware.

*By the F. B. Wheeler Company.*—1 case Locks.

*By Russell & Erwin Mfg. Company.*—9 cases Hardware.

*By B. F. Avery & Sons.*—1200 pounds Corn Planters, 12,990 pounds Cultivators.

*By R. W. Forbes & Son.*—4 packages Hardware, 4 dozen Bush Hooks, 112 pounds Oil Stone.

*By W. K. Freeman.*—2 boxes Iron Rakes, 5 boxes Forks, 14 cases Hardware.

*By Walter A. Wood Mowing and Reaping Machine Company*—200 Harvesters and Binders, 60 Mowers, 10 Hay Rakes, 4 Mowers, 2 Reaping Attachments, 12 Harvesters and Binders, 3 Hay Rakes.

*By A. Field & Co.*—9 cases Bolts.

*By S. Hofnung & Co.*—2 dozen Hay Forks, 17 gross Pencils, ½ dozen Sweepers, 42 gross Fruit Jars, 21 dozen Tinware, 54 dozen Broilers, 2 dozen, Hardware, 4 Air Guns, 1 gross Traps, 8 Locks, 4 dozen Lamp Goods, 84 dozen Traps, 2 dozen Tinware.

*By R. H. Dana & Co.*—10 dozen Forks, 63 dozen Hardware, 32 dozen Axes, 8 dozen Hammers, 2 cases Bolts, 1 dozen Hay Knives, 7 dozen Picture Cord, 12 cases Hardware, 101 dozen Axes, 10 dozen Spades, 30 dozen Snaths, 3 dozen Locks, 80 dozen Forks, 4 dozen Casters, 2 dozen Banks, 10 kegs Nails, 12 dozen Hoes, 2 cases Cartridge Shells, 8 dozen Lamps.

*By W. H. Crossman & Bro.*—22,400 pounds Barb Wire, 25 Scales, 2 dozen Miter Boxes, 12 dozen Toy Banks, 244 Oil Stoves, 6 dozen Plated Ware, 6 dozen Spades, 3 dozen Banks, 11 packages Lamp Goods, 30 dozen Hardware, 6 rolls Wire Cloth, 4 cases Hardware, 1 dozen Scales, 14 cases Hardware, 3 dozen Squares, 964 pounds Bolts, 7 cases Agricultural Implements, 8 Drills, 7 dozen Wrenches.

*By H. W. Peabody & Co.*—10,550 feet Wire Cloth, 32 packages Hardware, 6 dozen Sifters, 2 gross Egg Beaters, 6 dozen Forks, &c., 24 cases Hose Reels, 6 cases Bolts, 6 bundles Rakes.

*By Australasian-American Shipping Company.*—1 case Axes, 5 cases Forks, 1 case Reaper parts, 2 cases Forks, 9 cases Axles, 110 boxes Axes, 100 boxes Nails.

*By Arkell & Douglas.*—936 reels Barb Wire, 6 dozen Dies, 3 cases Butts, 400 pounds Nails, 20 Pumps, 120 dozen Wire, 18 dozen Hardware, 7 dozen Wringers, 22 dozen Lawn Mowers, 2 cases Bolts, 6 dozen Rakes, 2 cases Sandpaper, 1 dozen Bench Screws, 500 feet Hose, 84 dozen Hardware, 7 dozen Meat Choppers, 68 gross Wire Goods, 18 gross Fruit Jars, 20 Guns, 70,000 Cartridges, 2 gross Glue, 7 sets Axles, 9800 Bolts, 20 cases Hardware, 1 case Nails, 16 dozen Hog Ringers, 54 Churns, 1 gross Fly Traps, 16 gross Wire Goods, 90 dozen Hammers, 24 dozen Hay Forks, 8 dozen Hay Rakes, 48 Pumps, 3 dozen Hoes, 64 dozen Tools, 28 cases Hardware, 1153 dozen Axes, 30 dozen Lampware.

*By V. Posanta.*—1 box Sprinklers, 3 cases Horse Nails, 12 Churns, 5 dozen Axes, 13 dozen Locks, 13 dozen Traps, 12 dozen Hatchets, 1 dozen Rakes, 19 Hay Forks, &c., 6 dozen Egg Beaters, 2 dozen Mallets, 2 dozen Saws.

*By A. Field & Co.*—6 dozen Brushes, 24 dozen Axle Grease, 3½ dozen Tools.

PER SHIP GALGATE, JUNE 9, 1891, FOR MELBOURNE, AUSTRALIA.

*By Edward Miller & Co.*—53 packages Lamp Goods.

*By Winchester Repeating Arms Co.*—6 Rifles, 44,000 Cartridges, 31,000 Cartridge Shells.

*By Woodhouse & Stortz.*—29 cases Agricultural Implements, 236 pounds Hardware.

*By F. B. Wheeler Company.*—6 cases and 1 package Hardware.

*By Crane & McMahon.*—73 crates Refrigerators, 2 boxes Hardware.

*By McLean Bros. & Rigg.*—2 cases Hay Forks, 12 packages Road Scrapers, 63 dozen Drills, 14,000 Shot Cartridges, 2 dozen Washer Cutters, &c., 2 Lawn Mowers, 50 Refrigerators, 10 Hay Rakes, 7 gross Coat and Hat Hooks, 22 gross Fruit Jars, 55 dozen Axes, 4 gross Rat Traps, ½ dozen Axes, 560 pounds Whetstones, 7 dozen Door Fasteners, 1 Iron Vise, 84 dozen Tacks, 17 dozen Twine Boxes, &c., 602 packages Harvesting Machinery.

*By Strong & Trowbridge.*—160 pounds Stone, 206 pounds Nails, 10 dozen Hatchets, 40 pounds Hardware, 2 dozen Lampware, 9 dozen Door Springs, 17 Pumps, 269 pounds Nails, 1 case Hardware.

*By A. Field & Co.*—6 dozen Curry Combs, 3 dozen Brushes.

*By Coombs, Crosby & Eddy.*—6 dozen Axes, 10 gross Pencils.

*By Strong & Trowbridge.*—117 dozen Axes, ½ dozen Hardware, 98 dozen Lamp Ware, 30 pounds Bolts and Nuts, 5800 Bolts, 8 dozen Hoes, ½ dozen Mangles, 8 dozen Hardware, 4 dozen Broilers, 2 dozen Braces, 3 dozen Hay Knives, 6 dozen Hammers, 2 dozen Hardware, 5 dozen Draw Knives.

*By W. H. Crossman & Bro.*—9 dozen Bench Screws, 3 dozen Revolvers, 4 dozen Vises, 6 dozen Shears, 112 pounds Stone, 24 cases Hardware, 6 dozen Gas Stoves, 16,400 Loaded Shells, 10,000 Paper Shells, 30,000 Primers, 4 packages Pump Parts, 108 dozen Hardware, 400 pounds Nails, 1 case Hardware, 2 cases Hardware, 2 dozen Carpet Sweepers, 2 packages Plated Ware, 3 dozen Wringers, 6 dozen Bush Hooks, 32 dozen Axes, 1 gross Picture Cord, 54 dozen Traps, 4½ dozen Stencils, 7 cases and 1 box Hardware, 2¼ dozen Miter Boxes, 10 Refrigerators, 6 dozen Churns, 12 dozen Traps, 4 dozen Carpet Sweepers, 4 cases Hardware, 13 cases and 7 casks Pump Parts, 1500 Washers, 24 Refrigerators.

*By H. W. Peabody & Co.*—8000 Cartridges, 2 dozen Scythes, 3 cases Tools, 1 case Hardware, 1 case Hardware, 39 packages Lawn Mowers, 3 cases Hardware, 4 cases Wringers, 5 cases Forks, 4 packages Hardware, 1 case Lamp Ware, 655 pounds Bolts, 8 dozen Hoes, 1 case Tools, 10 dozen Snaths, 1 case Mouse Traps, 15 packages Farming Implements, 84 pounds Rivets, 1 case Files, 4 cases Wringers, 2 packages Emery Wheels, 400 pounds Binder Twine.

*By Wm. E. Peck.*—1400 pounds Nails, 1 case Hardware, 36 dozen Blocks.

*By R. W. Forbes & Son.*—6 packages Hardware, 11,000 Shells, 6 cases Carriage Bolts, 3 cases Axles, 15 packages Carriage Hardware6 10 dozen Hammers, 6 packages Hardware, 6 dozen Hammers, 10 packages Lamp Ware, 3 cases Wire Goods, 3 dozen Carpet Sweepers, 3 dozen Wringers, 10 packages Hardware.

*By R. W. Cameron & Co.*—8 cases and 8 packages Garden Hose, 14 crates Stoves.

## Paints and Colors.

*It should be understood that the prices quoted in this column are strictly those current in the wholesale market, and that higher prices are paid for retail lots. The quality of goods frequently necessitates a considerable range of prices.*

The general movement in Paints and Colors has been of routine character, and aside from more or less modification of prices of some lines of Oil Colors and Mixed Paints, prompted by the second re reduction in cost of Linseed Oil, values remain stationary. In some quarters disappointment with the volume of business is expressed, and there is also some complaint as to collections. As a rule, however, it is stated that the general distribution compares favorably with the average for the season, and that general results are all that could reasonably be expected in view of the condition of affairs in other branches of trade.

*White Lead.*—Corroders have made no change in their prices. Some manufacturers of Mixed Lead, it is asserted, have shaded their former rates, owing to the cheaper cost of Oil, but it does not appear that that movement has increased the sale of the goods sufficiently to annoy corroders. As to the movement of supplies nothing new is noted, and the general demand is similar in nearly all respects to what is usually experienced at this season.

*Zincs.*—The strike at the New Jersey Zinc Works has reduced the available supply of American oxide to some extent, and deliveries on back orders are not wholly satisfactory. The entire current product is being absorbed, and new orders, while not numerous, are taken with some reserve. No changes in prices are made, despite the strong position. Instead, preparations are making for a larger output. The production of one prominent manufacturer will be increased 50 % in a short time.

*Colors.*—In the general line of dry Colors business has been of routine character, and the distribution, to all accounts, continues quite as full as usual at this season. In some few instances slight concessions are learned of as being made where particularly attractive orders are involved, but, as a whole, values remain very steady, and there is nothing in present conditions indicative of any radical movement in the immediate future. Prices for Oil Colors are somewhat unsettled, consequent upon the reduction in cost of Oil, but manufacturers will soon have their figures adjusted to the new conditions, and the probabilities are that the market will soon be marked by the customary steadiness.

### Oils and Turpentine.

The most important movement in this line has been a reduction in the price of Linseed Oil, particulars of which are given below. Outside of this the changes in values have been slight and the general market is in practically the same position that it was a week ago. Business is spiritless, yet the distribution of the leading varieties of Oils appears to be in line with what is usual at this period of the year and only a few instances of any conditions calculated to cause buyers to deviate in the slightest degree from a conservative policy.

*Linseed Oil.*—City crushers have reduced their prices to 49¢ per gallon for Oil made from American seed and 58¢ for Calcutta seed product. The National Oil Company have marked their price down to 47¢ for deliveries in New York and vicinity and outside crushers have, as a matter of course, followed suit. For that matter, it is intimated that large buyers can secure outside brands at less than 47¢. The decline is attributed to a fall in the price of domestic flaxseed, which is now about 5¢ per bushel lower than it was two weeks ago, but evidence is not wanting that sharp competition between western crushers has had as much influence as the reduction in cost of raw material, and the surface indications are that the contest will continue until independent crushers are brought to terms by the combine or prove their ability to successfully combat with the latter. Linseed Oil at present prices will doubtless regain ground captured by manufacturers of substitutes and adulterants when the cost of the pure seed product was 8¢ @ 10¢ ℔ gallon higher than it is at present, but the demand has, as yet, improved to a moderate extent only.

*Cotton-Seed Oils.*—While not of more than fair volume, business in refined Cotton-Seed Oils has been somewhat larger the past week, and the market is looking steadier at a slightly lower level of prices Exporters have taken about 1500 barrels butter quality at prices equivalent to 42¢ @ 42½¢ here. Several parcels of Prime Summer Yellow went at 37¢ @ 37½¢, good "off" grade at 34¢ @ 35¢ and dark color stock at 33¢ @ 33½¢. Crude product is having very slow movement at present, and the moderate trade passing is chiefly at prices on the basis of 31¢ @ 32¢ for prime quality.

*Lard Oil.*—City brands have been selling at prices within the range of 51¢ @ 53¢ and Western at 50¢ @ 51¢, values moving somewhat irregularly in response to the fluctuation in cost of raw material. The market is barely steady at this writing.

*Menhaden Oil.*—The crude Oil manufacturers' combine have marked their prices up to the basis of 27¢ ℔ gallon for prime light stock, claiming that the fishing thus far has been moderate and that the chances are against a surplus production of Oil. Buyers hold aloof, however, and no business of importance is under treaty. Manufacturers are sellers of Pressed and Bleached product at old prices.

*Miscellaneous.*—There has been no change in the market for Sperm or Whale Oils. Olive Oil is quite firm, and the balance of the list steady but quiet.

*Spirits Turpentine.*—Prices have remained stationary throughout the week. Reports from the Southern centers noted a very firm feeling there, but that fact has been offset in a great measure by the sluggish condition of the local market.

## CONTENTS.

PAGE.

Wright Triple-Expansion Engine. Illus. ..1203
Cost of Tin-Plate Plant.....1207
On the Exact Subdivision of an Index Wheel into any Required Number of Equal Parts. Illustrated.....1208
A Belt Dynamometer. Illustrated .....1209
The Chicago Wire Goods Company's Failure 1209
For South American Trade.....1209
Manganese Steel.....1210
A New Belt-testing Machine. Illustrated...1213
Uniform Bill of Lading.....1214
Chicago Industrial Statistics.....1214
Steel Castings.....1215
New Trade Regulations .....1216
Mechanical Engineers.....1217
The Virginia Development Company.....1230
The Week.....1231

Editorials:
The Tin-Plate Situation.....1232
Short Hours in the Shipbuilding Industry .....1232
Business Conservatism.....1233
Brands Losing Their Prestige .....1233
The Recovery of Ammonia.....1233
The Duty on Plate Shearings.....1234

Obituary.....1234
Correspondence.....1234
Brown Hoisting and Conveying Machine....1235
The Eastern Scale.....1235
Washington News.....1236
A New Trades School.....1236
Manufacturing: Iron and Steel, Machinery, Hardware, Miscellaneous.....1237-1238
The Scotch Iron Gamble.....1238

Trade Report: Philadelphia, Cincinnati, Chicago, Detroit, Cleveland, New York, Louisville, St. Louis, Pittsburgh, Metal Market, New York Metal Exchange, Imports, Coal Market, Financial, British Iron and Metal Markets .....1238-1243

Hardware: Condition of Trade, Notes on Prices, Trade Items, "No Time to Read," Trade Topics, File and Saw Rack—Illustrated, Retail Hardware and Stove Dealers' Association, Brush Marking—Illustrated, A Word to Young Salesmen, Stock and Time Card, Price-Lists, Circulars, &c., Methods of Circularizing, It Is Reported—, Prices, Up or Down? Exports, Paints and Colors.....1244-1250
Success Can Opener. Illustrated .....1251
New Improved Force Sprinkler and Pump Illustrated.....1251
Glauber Improved Stop and Waste Cock. Il.1251
Hayes Double-Acting Force Pump. Illus...1251
Loyal Fence Wire Lock. Illustrated.....1252
The Skidmore Adjustable Window Balcony. Illustrated.....1252
Empire Fly Escape Screen. Illustrated.....1252
Alligator Ice-Cracking Machine. Illus.....1252
Chair Hammock. Illustrated.....1253
The Haggerty Furnace. Illustrated.....1253
Current Hardware Prices.....1254-1259
Current Metal Prices.....1260

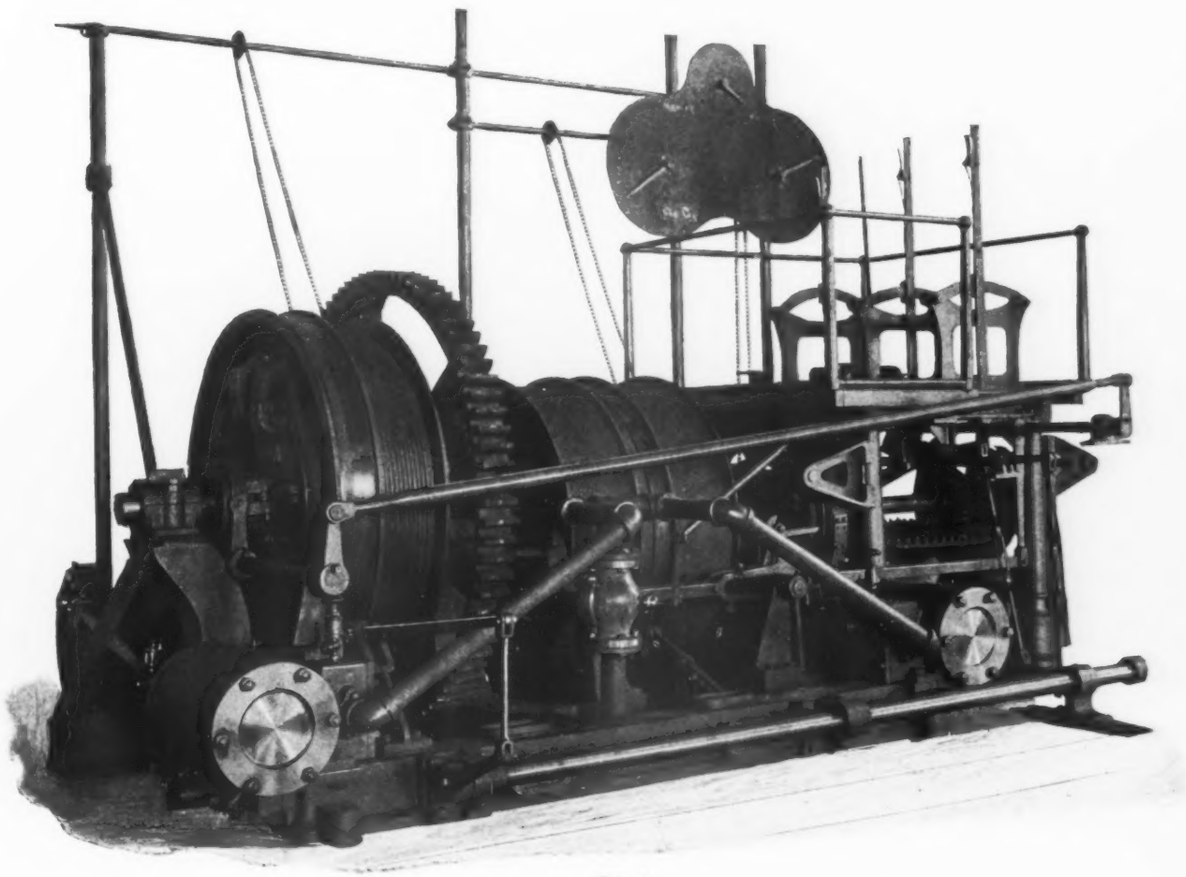


FIG. 2.

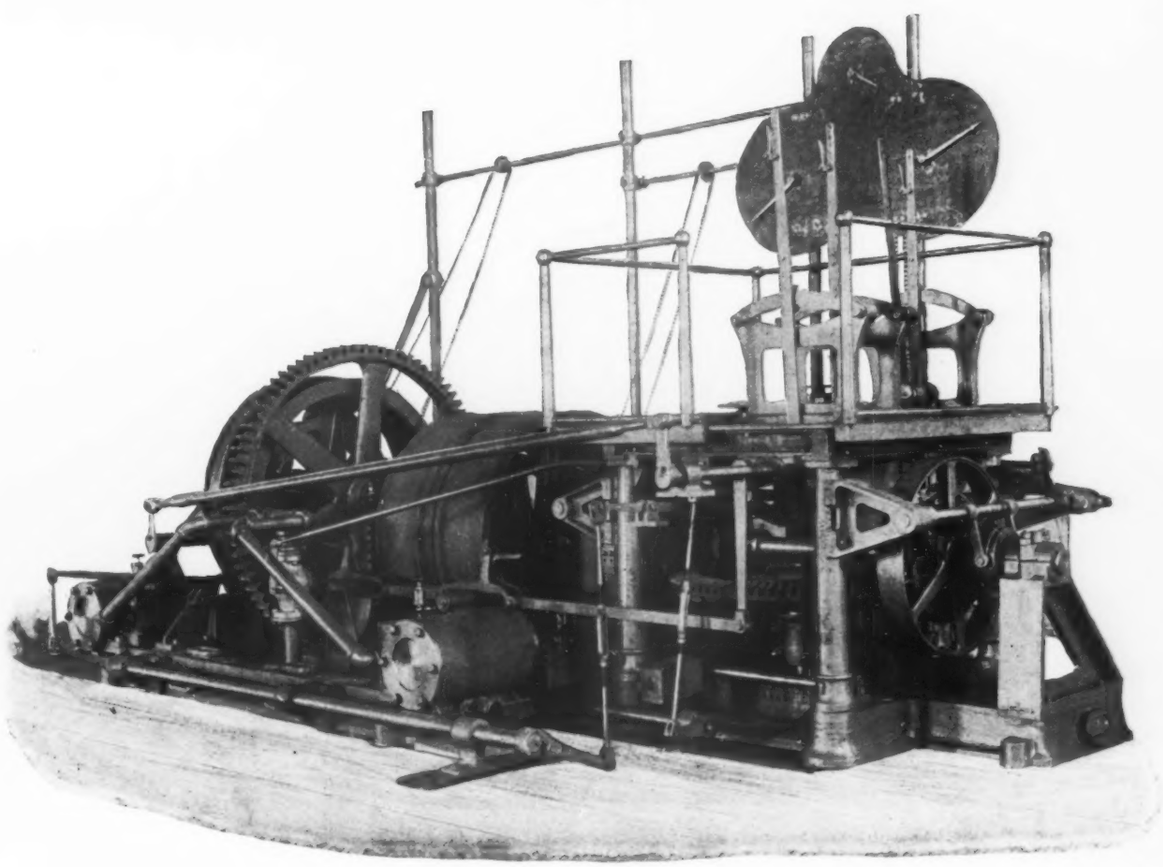
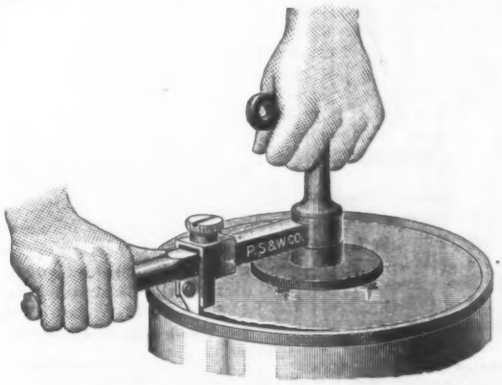


FIG. 3.

OPERATING MACHINERY OF BROWN HOISTING AND CONVEYING MACHINE AT THE STEEL WORKS OF JONES & LAUGHLINS (LTD.)

### Success Can Opener.

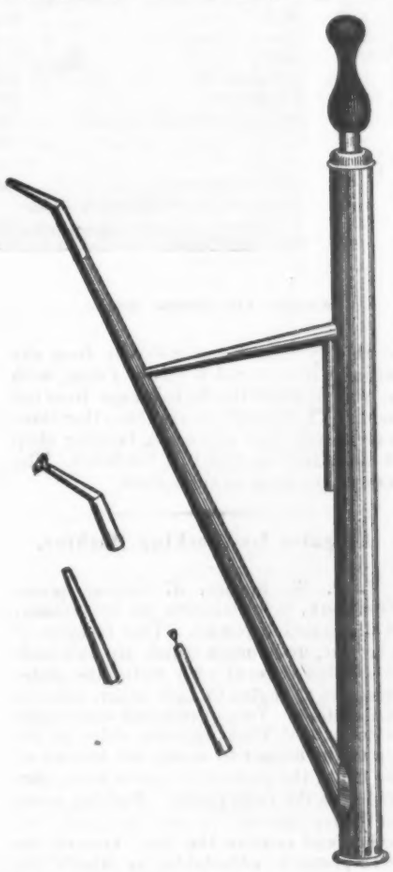
Peck, Stow & Wilcox Company, Southington, Conn., and 27 Chambers street, New York, are introducing a can opener, as illustrated herewith. The plate, which is placed at the center of the can cover, is provided on the lower side with three sharp prongs, which hold it rigidly in place. The bar is then revolved with the other hand. The adjustment of the knife allows of a hole being cut from 2½ to 5½ inches in diameter. The handle is large enough to allow the operator to secure a firm and easy grip upon it. The can opener is referred to by the manufacturers as simple, safe, sure and strong; excellent, expeditious, pointed and positive.




*Success Can Opener.*

### New Improved Force Sprinkler and Pump.

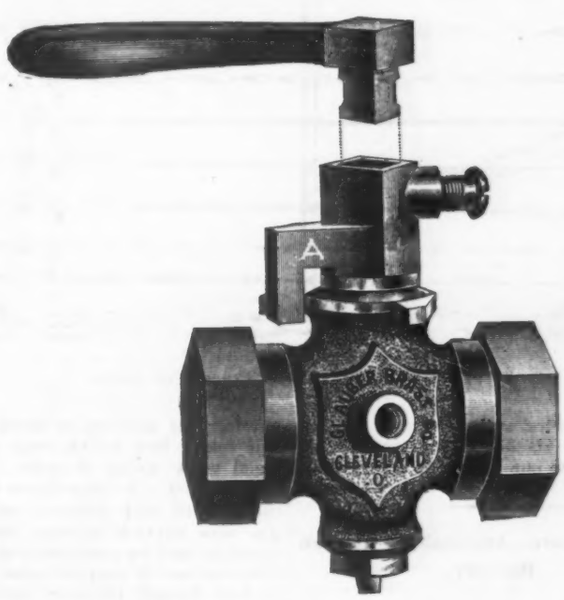
Fernando B. Smith, Canton, Ohio, is offering the trade an improved force sprinkler and pump, as illustrated herewith. This is a lacquered metal pump, with wooden rod, and is designed to be set in a bucket or tub of water. Four nozzles, as shown in the cut, accompany each pump, providing for various sprays and streams for different purposes. The air valve and hinge are of copper. The perforated bottom is designed to prevent all substances from getting into the pump that would obstruct the valves. It is stated that the pump combines all the features necessary for an efficient force pump, which is referred to as a very essential feature to be considered. The manufacturers claim that the pump throws a strong stream 60 feet or more. It is recommended for washing windows or carriages, extinguishing fires, showering lawns, gardens and greenhouses; sprinkling flowers, vines and plants, and for throwing liquid solutions to destroy noxious insects and bugs.



*New Improved Force Sprinkler and Pump.*

### Glauber Improved Stop and Waste Cock.

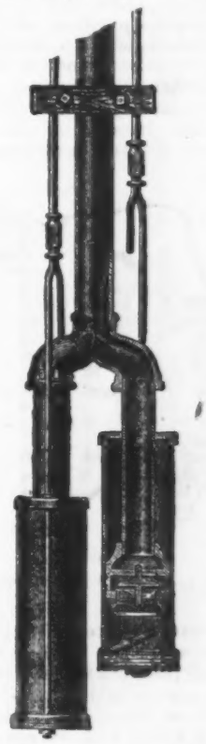
Glauber Brass Mfg. Company, Cleveland, Ohio, are offering to the trade a stop and waste cock, as illustrated herewith. The plug and check A are cast in one piece, entirely of brass, to overcome the rusting, breaking or twisting off, as is apt to occur with an iron check or pin check. These cocks are guaranteed by the manufacturers not to leak, and are tested at 200 pounds water pressure. They are described as made of the very best material, new hard brass, and the handles of the cocks are interchangeable.




*Glauber Improved Stop and Waste Cock.*

### Hayes Double-Acting Force Pump.

The Hayes Pump and Planter Company, Galva, Ill., are offering the trade a double-acting force pump, as illustrated herewith.



*Hayes Double-Acting Force Pump.*

It is described as having the cylinders placed at the bottom of the pump rod, which are moved alternately, and are always submerged. A turned plunger with water rings is used. The valve seat is brass with a leather face, and the bottoms of the cylinders are protected by wire screens. It is claimed that the cylinders never lose their priming and that they give a constant and steady flow of water. In this pump, as usually constructed, two cylinders are used, but a single-cylinder pump, and a triple-cylinder pump are also made, the latter being for horse or steam power. The triple-cylinder pump is made in 3, 3½ and 4 inch cylinders.

### Loyal Fence Wire Lock.

Wire Fence Supply Company, Indianapolis, Ind., are offering the trade a fence wire lock, as illustrated herewith. The manufacturers claim that it is a perfect wire stretcher, a practical wire tightener, a simple tension adjuster and a wire lock operated by a common wrench. They also claim that by its use only one half of the usual quantity of fence posts are required; that the cost of fencing is reduced, and that every farmer can build

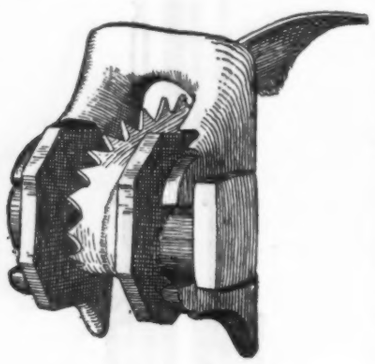


*Fig. 1.—Loyal Fence Wire Lock.*

his own patent fence. Fig. 2 shows the manner in which the Loyal locks are used. The corner posts are first set and braced. The next post is set half way between the ends of the stretch. If the stretch is over 40 rods a Loyal lock is placed at both ends of each strand of wire. The wires are stapled loosely to the middle post and are stretched by winding up the lock with a wagon or screw wrench, when, it is stated, the tension of the wire will hold the lock in place. Slats or wood stays are tied to the wires at suitable distances. The point is made that the lock will hold

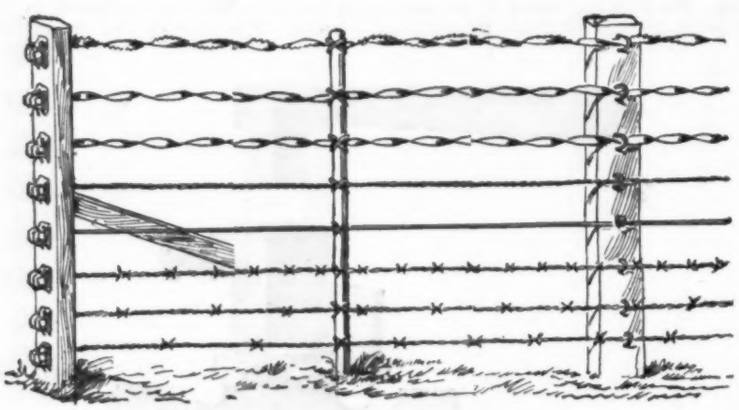


*Fig. 2.—Using the Loyal Fence Wire Lock.*

any make of wire, and that in the fall the wires can be slackened and in summer tightened from one corner in a very short time.

### The Skidmore Adjustable Window Balcony.

The multiplication of high buildings in large cities has created a demand for special appliances to be used in connection with them. Among these are safeguards for janitors and window cleaners who are obliged to risk their lives in endeavoring to reach the exteriors of windows. Skidmore's Patent Adjustable Window Balcony is a device invented to meet this demand, and it has been received with much favor in Chicago. Fig. 1 shows this balcony in use by a man washing windows. It may also be used as a fire escape. It will be seen that it affords a very safe platform for a workman, having guard rails on the sides and in front which prevent him from falling. The main feature of this balcony is shown in

*Fig. 1.—Skidmore's Adjustable Window Balcony.*

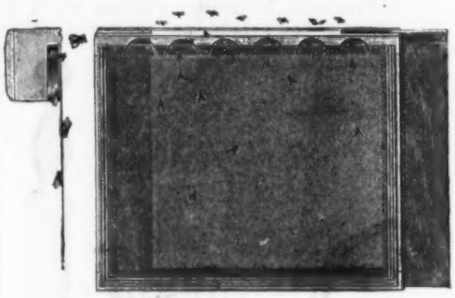
Fig. 2. There are two adjustable brackets like this, one for the left side of the window frame and one for the right side. One end of the horizontal arm is bent at right angles and enters the window frame through a brass plate, thus reaching behind the masonry or iron work and insuring a safe hold. The lower arm, which serves as a brace, slides along the horizontal arm and is secured by a set screw; it is adjustable to any form of molding or depth of frame, and has a foot which rests against the wood work about 8 inches below the hooked arm. A brass sleeve is fitted on the end of each bracket, and a piece of gas pipe extends through both sleeves, being secured by a set screw at any width. The platform is made of wood, supported by two hinged straps of wrought iron. In one end of each strap is an eye or hole to pass over the heads of screws in the window sill, while the other ends are bent to hook over the horizontal rod. The only fittings to be permanently attached to a window for the use of this balcony are the small brass plates on each side of the frame and the two screws on the sill. The balcony itself is portable, and is carried from window to window. The Rookery Building, in Chicago, 11 stories high, with 1080 windows, has every one fitted for this device. The balcony, in connection with a rope, is an admirable fire escape, as it can be taken to the windward side of a building in case the permanent

*Fig. 2.—Adjustable Brackets for Window Balcony.*

fire escape is surrounded with flames and smoke. The sole owners and manufacturers of the Skidmore balcony are the Orr & Lockett Hardware Company, 184 and 186 Clark street, Chicago.

### Empire Fly Escape Screen.

Morley Brothers, Saginaw, Mich., are offering the trade a fly escape screen, as illustrated herewith. This is an adjustable spring screen with semicircles cut in the upper part of the frame, the openings being but partially covered with the screen wire. In placing the screen in the window the openings are put toward the outside, as shown in the cross-section view; the flies will gain their freedom by passing through the openings into the open air. The screen is made on the principle



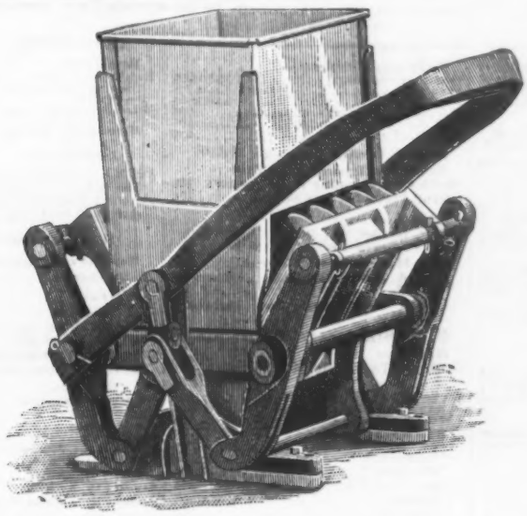
*Empire Fly Escape Screen.*

of the fly trap, being different from the ordinary screen, which acts as a cage, with no way to allow the fly to escape from the room. The manufacturers claim that these screens will clear any room, butcher shop or store free from flies in a few hours. The screens are made in three sizes.

### Alligator Ice-Cracking Machine.

P. P. W. Spence, 37 College place, New York, is introducing an ice cracker, as illustrated herewith. This consists of a hopper, underneath which are two cast-iron plates covered with teeth, the plates being set at angles to each other, open at the bottom. Two perforated sheet-steel plates extend from opposite sides of the top of the hopper to nearly the bottom of the teeth, the perforated plates being parallel with the teeth plates. Pushing down the lever handle presses the teeth together and crushes the ice. One of the teeth plates is adjustable, by which the size of ice leaving the machine may be regulated. The use of the perforated plates is to provide smooth surfaces for the ice to slide down into the machine as far as its size will permit, when the teeth coming through the perforations crack it

until small enough to pass into a receptacle below. The machine cracks ice rapidly, easily, cleanly, economically and uniformly; and being adjustable, large or small lumps can be had. All the working parts which the ice comes in contact with



*Alligator Ice-Cracking Machine.*

are galvanized to prevent rusting. Three sizes of machines are made; the smaller size is mounted on a cast table with legs; the largest size is operated by either hand or power. The movement of the cracker is powerful, the parts strong and interchangeable, and each machine is warranted for one year.

### Chair Hammock.

White & Ballard, Washington Court House, Ohio, are introducing a chair hammock, as illustrated herewith. The hammock frame is made of white ash, nicely varnished; the netting and ropes are of white cotton, making an attractive contrast. The chair may be adjusted to any desired position at will by raising or lowering the wooden block on the rear rope for the back, or by wrapping the ropes over either corner to raise the front. The foot rest is raised or lowered by the wooden blocks, making out of it a foot or book rest, and the hammock may be turned to face any desired point at will by the occupant. It is also recommended for the use of children, being large and strong enough to accommodate several at a time. It is light, weighing but 7 pounds; airy and cool. It can be put up in any suitable place by means of a screw hammock hook, and can be hung out of the way in an instant with the ropes folded underneath. When taken down it drops into position of its own accord. The manufacturers state that to try one is to buy one.

*Chair Hammock.*

### The Haggerty Furnace.

The accompanying illustration shows the Haggerty Furnace, being introduced to the trade by the Nason Mfg. Company, 71 Beekman street, New York. The furnace was designed to prevent the pot from upsetting and spilling the metal, a difficulty that has been a source of complaint with the old style of furnace. The Haggerty

*The Haggerty Furnace.*

Furnace, as shown in the illustration, is provided with slides which engage with lugs cast on the pot. As the charcoal burns the pot follows down and rests on stops on the slides, which keep it suspended 2 inches above the grate. We understand that the furnace has given a great deal of satisfaction whenever used and is now employed by some of the largest plumbing firms in New York.

The National Tube Works Company of McKeesport, Pa., have notified the Hospital Committee of that city that they will donate $5000 toward the erection of a hospital, on condition that the committee raise $45,000. W. Dewees Wood Company of McKeesport, Pa., have also signified their intention of contributing liberally to the project.

All tin plate entered for immediate transportation to other points will be dutiable at the old rate of 1 cent per pound ad valorem instead of $2\frac{3}{5}$ cents per pound whether arriving at the place of destination before or after July 1, provided the same be entered at the port of original entry before that date.

The National Master Mechanics' Convention was brought to a close at Cape May on the 18th inst. The officers elected were: President, John McKenzie, Cleveland, Ohio; treasurer, O. Stewart, Charlestown, Mass.; secretary, August St. Clair, New York.

# CURRENT HARDWARE PRICES.

## JUNE 24, 1891.

*No's.*—The quotations given below represent the Current Hardware Prices which prevail in the market at large. They are not given as manufacturer's Prices, and manufacturers should not be held responsible for them. In cases where goods are quoted at lower figures than the manufacturers name, it is not stated that the manufacturers are selling at the prices quoted, but simply that the goods are being sold, perhaps by the manufacturers, perhaps by the jobbers at the figures named.

### Adjusters, Blind.

Domestic ..... ₩ doz $3.00, 33⅓%
Excelsior ..... ₩ doz $10.00 ..... 50&10&2%
Washburn's Self-Locking ..... 30@30&10%

### Ammunition.—

*Caps, Percussion, ₩ 1000—*
Hicks & Goldmark's and Union Metallic Cartridge Co.
F. L. Waterproof, 1-10's ..... 35@37½
E. B. Trimmed Edge, 1-10's ..... 47½@50
E. B. Grnd. Edge, Cent. Fire, 1-10's ..... 47½@50
Musket Waterproof, 1-10's ..... 50@53½
G. D. ..... 27@30½
E. B. Genuine Imported ..... 45½
Eley's E. B. ..... 54½ @ 57½
Eley's D Waterproof, Central Fire ... $1.60

*Cartridges—*
Rim Fire Cartridges ..... 50&5&2 %
Rim Fire Military ..... 15&2 %
Cent. Fire, Pistol and Rifle ..... 35&5&2 %
Cent. Fire, Military and Sporting ..... 15&5&2 %
Blank Cartridges, except 22 and 32 cal., additional 10 % on above discounts.
Blank Cartridges, 22 cal., $1.75 ..... 2 %
Blank Cartridges, 32 cal., $3.50 ..... 2 %
Primed Shells and Bullets ..... 15&5&2 %
B. B. Caps, Round Ball, $1.75 ..... 2 %
B. B. Caps, Con. Ball, Swgd., $2.00 ..... 2%

*Primers—*
Berdan Primers, $1.00 ..... 2%
B. L. Caps (for Sturtevant Shells) $1.00 ..... 2%
All other Primers, $1.20 ..... 2%

*Shells—*
First quality 4, 8, 10 and 12 gauge ..... 25&10&2%
First quality, 14, 16 and 20 gauge ($10 list) ..... 30&10&2%
Prize ..... 40&2%
Star, Club, Rival and Climax brands ..... 33⅓&10&2%
Selbold's Comb. Shot Shells ..... 15&2%
Brass Shot Shells, 1st quality ..... 60&2%
Brass Shot Shells, Club, Rival, Climax .. 65&2%

*Shells Loaded—*
Standard List, July 19, 1890 .. 40&10&10%

*Wads*—Price per M.

| | | |
|---|---|---|
| U.M.C.&W. R. A.—B. E., 11 up... | 66¢ | Dis. 30&2 |
| U.M.C.&W. R. A.—B. E., 9&10... | 82¢ | |
| U.M.C.&W. R. A.—B. E., 8..... | 96¢ | |
| U.M.C.&W.R.A.—B. E., 7 ..... | $1.10 | |
| U.M.C.&W. R. A.—P. E., 11 up.. | 1.15 | |
| U.M.C.&W. R. A.—P. E., 9&10.. | 1.50 | |
| U.M.C.&W. R. A.—P. E., 8..... | 1.70 | |
| U.M.C.&W.R.A.—P. E., 7..... | 1.80 | |
| Eley's B. E., 11 up. ..... | $1.75 | |
| Eley's P. E., 11@20 ..... | 2.80 | |

### Anvils.—

Eagle Anvils, ₩ ℔ 10¢ ..... 15@15&5%
Peter Wright's ..... 11@11½¢
Armitage's Mouse Hole ..... 10½@11¢
Armitage's Mouse Hole, Extra .. 12@12½¢
Trenton ..... 10@10½¢
Wilkinson's ..... 10½@11¢
Moore & Barnes Mfg. Co ..... 33⅓%

*Anvil Vise and Drill—*
Millers Falls Co., $18.00 ..... 20%
Cheney Anvil and Vise ..... 25%
Allen Anvil and Vise, $3.00 ..... 40&10%
Star ..... 45&5 %

### Apple Parers—See Parers, Apple, &c.

### Augers and Bits—

Douglass Mfg. Co. ..... 70&10%
Wm. A. Ives & Co. ..... 70&10%
Humphreysville Mfg. Co. ..... 70&10%
French, Swift & Co. (F. H. Beecher, P. S. & W. Co ..... 70&10%
Rockford Bit Company ..... 70&10%
Cook's, Douglass Mfg. Co ..... 70&10%
Cook's, N. H. Copper Co. 50&10@50&10&5%
Ives' Circular Lip ..... 60%
Patent Solid Head ..... 30%
C. E. Jenning & Co., No. 10, extension lip ..... 40%
C. E. Jennings & Co., No. 30 ..... 60%
C. E. Jennings & Co., Auger Bits, ₩ set, 33⅓ quarters, No. 5, $5; No. 30, $3.50 .. 20%
Lowis' Patent Single Twist ..... 45%
Russell Jennings' Augers and Bits .. 25&10%
Imitation Jennings' Bits ..... 60@60&5%
Snell's Jennings Pattern ..... 60%
Pugh's Black ..... 20%
Rockford, Jenning's Pattern ..... 60%
Car Bits ..... 60@60&10%
Car Bits, P. S. & W. Co ..... 60&10%
Snell's Car Bits ..... 60%
L Hommodieu Car Bits ..... 15&10%
Forstner Pat. Auger Bits ..... 20%
Cincinnati Bell-Hangers' Bits .... 30&10%

*Bit Stock Drills—*
Morse Twist Drills ..... 50&10&5%
Standard ..... 50&10&5%
Cleveland ..... 50&10&5%
Syracuse, for metal ..... 50&10%
Syracuse, for wood (wood list) .. 30@30&5%
Williams' or Holt's, for metal .. 50&10&10%
Williams' or Holt's, for wood .. 40&10%
Cincinnati, for wood ..... 30&10%
Cincinnati, for metal ..... 45&10%

*Expansive Bits—*
Clarks' small, $18; large, $26 ₩ .. 35@35&5%
Ives' No. 4, ₩ doz $60 ..... 40%
Swan's ..... 40%
Steer's, No. 1, $20; No. 2, $23 ..... 35%
Stearns' No. 2, $48 ..... 20%

*Gimlet Bits—*
Common ..... ₩ gross $2.75@3.25
Diamond ..... ₩ doz $1.10 ..... 25&10%
Bee ..... 35@35&5%
Double Cut, Shepardson's .... 45@45&10%
Double Cut, Ct. Valley Mfg. Co ... 30&10%
Double Cut, Hartwell's, ₩ gro. ..... $5.25
Double Cut, Douglass' ..... 40&10%
Double Cut, Ives' ..... 60@60&10%

*Hollow Augers—*
Ives ..... 33⅓ @ 33⅓&10%
French, Swift & Co. ..... 33⅓ @ 33⅓&10%
Douglass' ..... 33⅓ @ 33⅓&10%
Bonney's Adjustable, ₩ doz $48 .... 40&10%
Stearns' ..... 20&10%
Ives' Expansive, each $4.50 ..... 50&5%
Universal Expansive, each $4.50 ..... 20%
Wood's ..... 25@25&10%
Cincinnati Adjustable ..... 25&10%
Cincinnati Standard ..... 25&10%

*Ship Augers and Bits—*
L'Hommedieu's ..... 15&10@15&10&5%
Watrous' ..... 15&10@15&10&10%
Snell's ..... 15&10@15&10&5%
Snell's Ship Auger Patt'n Car Bits, 15&10@15&10@5%

### Awl Hafts—See Hafts, Awl.

### Awls, Brad Sets, &c—

Awls, Sewing, Common ₩ gr $1.70, 35%
Awls, Should. Peg, ₩ gr $2.45, 40@40&10%
Awls, Pat. Peg ... ₩ gr 65¢ ..... 40@40&10%
Awls, Shouldered Brad .. 2.70 ₩ gr ..... 35%
Awls, Handled Brad ... $7.50 ₩ gr ..... 45%
Awls, Handled Scratch ₩ gr, $7.50 .. 35&10%
Awls, Socket Scratch, ₩ doz. $1.50 .. 25@30%

### Awl and Tool Sets—See Sets, Awl and Tool.

### Axes—

| | Plain. | Beveled. |
|---|---|---|
| First quality, best brands | $7.00 @ | $7.50 |
| First qual., other brands | 6.62½ @ 6.75 | |
| Second quality | 6.00 | 6.50 |

### Axle Grease—See Grease, Axle.

### Axles—

No. 1, 4½¢@5¢, No. 2 5½¢@6¢, 3 % cash
Nos. 7 to 14 ..... 55&5%
Nos. 15 to 18 ..... 47½%
Nos. 19 to 22 ..... 70%
Concord Axles, loose collar ..... 5½@6¢
Concord Axles, solid collar ..... 6@7¢
National Tubular Self-Oiling ..... 33⅓%@33⅓&5%

## Bag Holders.—See Holders, Bag.

### Balances—

Spring Balances ..... 40%

| Chatillon, ₩ doz | No. 2000 | 20 | 80 |
|---|---|---|---|
| | $0.80 | 0.95 | 1.75 net |

Chatillon Straight Balances ..... 40%
Chatillon Circular Balances ..... 50&10%

### Bars.

*Crow—*
Cast Steel ..... ₩ ℔ 3½¢
Iron, Steel Points ..... ₩ ℔ 3¢

### Basins, Wash—

Standard Piberware, No. 1, 10½-inch, $2; 12-inch, $2.25; 13½-inch, $2.75; 15-inch, $3.25.

### Beams, Scale—

Scale Beams, List Jan. 12, '83 ... 50&10@50&10&5%
Chatillon's No. 1 ..... 40%
Chatillon's No. 2 ..... 50%
Custer's ..... 33⅓%

### Beaters—

*Egg—*
Dover ..... ₩ doz $1.50
Duplex (Standard Co.) ..... ₩ doz $1.25
Rival (Standard Co.) ..... ₩ doz $1.00
Duplex Extra Heavy (Standard Co.) ..... ₩ doz $3.50
Bryant's ..... ₩ gro $14.00
Double (H. & R. Mfg. Co.), ₩ gro. No. 0, $12.00; No. 1, $15.00; No. 2 ..... $36.00
Easy (H. & R. Mfg. Co.) ..... ₩ gro $12.00
Triple (H. & R. Mfg. Co.) ..... ₩ gro $16.50
Spiral ..... ₩ gro $4.25 @ 4.50
Improved Acme (H. & R. Mfg. Co.) ..... ₩ gro $9.00
Paine, Diehl & Co.'s ..... ₩ gro $24.00
Silver & Co ..... ₩ doz $5.50

*Culinary—*
Keystone, P.D.&C., Each, No. 1, $1; No. 2, $2 ..... 20 %

### Bells—

*Cow—*
Common Wrought ..... 60&10%
Western ..... 20&10%
Western, Sargent's list ..... 70&10%
Kentucky, "Star" ..... 20&10%
Kentucky, Sargent's list ..... 70&10%
Kentucky Durham ..... 70&10
Dodge, Genuine Kentucky ..... 70@70&10%
Texas Star ..... 50&10@50&10&5%
Call ..... 40@40&5%
Farm Bells ..... ₩ ℔ 3¢@3½¢
Steel Alloy Church and School Bells .. 40%

*Door—*
Gong, Abbe's ..... 33⅓&10%
Gong, Yankee ..... 45&10%
Gong, Barlow's ..... 40&10@50%
Crank, Taylor's ..... 25&10%
Crank Brooks' ..... 50&10&2%
Crank Cone's ..... 10%
Crank, Connel's ..... 20&10%
Lever, Sargent's ..... 60&10%
Lever, Taylor's Bronzed or Plated .... net
Lever, Taylor's Japanned ..... 25&10%
Lever, R. E. M. Co.'s ..... 50&10&2%
Pull, Brook's ..... 50&10&2%
Pull, Western ..... 25&10%

*Electric,*
Wollensak's ..... 20%
Bigelow & Dowse ..... 20%
Taylor's ..... 20%

*Hand—*
Light Brass ..... 75&10%
Extra Heavy ..... 65&10%
White Metal ..... 60&10&10%
Silver Chime ..... 33⅓&10%
Globe Cone's Patent) ..... 25&10&35%

### Bellows—

Blacksmiths' ..... 60&5@65%
Molders' ..... 40@40&10%
Hand Bellows ..... 40&10@50%

### Belting, Rubber—

Common Standard ..... 70@70&5%
Standard ..... 60&10&10@70%
Extra ..... 50&10@60%
N.Y.B.&P.Co., Carbon ..... 60%
N.Y.B.&P.Co., Diamond ..... 50%
N.Y.B.&P.Co., Para ..... 40%

### Bench Stops—See Stops, Bench.

### Benders, Upsetters, Tire.

Stoddard's Lightning Tire Upsetters .. 15%
Detroit Perfected Tire Bender ..... 15%

### Bits—

Auger, Gimlet, Bit Stock, Drills, &c., see Augers and Bits.

### Bit Holders—See Holders.

### Blind Adjusters—See Adjusters, Blind.

### Blind Fasteners—See Fasteners, Blind.

### Blind Staples—See Staples, Blind.

### Blocks—

Ordinary Tackle, list May 20, 1889 ... 70@70&5%
Cleveland Block Co., Mal. Iron ..... 50%
Moore's Novelty, Mal. Iron ..... 50%
Sure Grip Steel Tackle Blocks ..... 25%

### Boards, Stove.

Wood Lined "Crystal" ..... 50%
"Embossed" ..... 50%
"Oxidized" ..... 45%
Paper Lined Zinc ..... 55%
"Crystal" ..... 55%
"Embossed" ..... 55%
"Oxidized" ..... 45%

### Bolts—

*Carriage, Machine, &c.—*
Com. list June 10, '84 ..... 75&10&2%
Genuine Eagle, list Oct., '84 .. 75&10@80%
Philia. pattern, list Oct. 7, '84 .. 80@80&10%
R.B.&W., old list ..... 70%
Machine, list Jan. 1, 1890 ..... 75&10@75&10&5%
Bolt Ends, list Jan. 1, 1890 ..... 75&10@75&10&5%

*Door and Shutter—*
Cast Iron Barrel, Square, &c .. 70@70&10%
Cast Iron Shutter Bolts ..... 70@70&10%
Cast Iron Chain (Sargent's list) .... 65&10%
Ives' Patent Door Bolts ..... 60%
Wrought Barrel ..... 70@70&10%
Wrought Square ..... 70@70&10%
Wr't Shutter, all Iron, Stanley's .. 60&10%
Wr't Shutter, Brass Knob, " .. 40&10%
Wr't Shutter, Sargent's list ..... 60&10%
Wr't Sunk Flush, Sargent's list ... 55&10%
Wr't Sunk Flush, Stanley's list ... 50&10%
Wr't B.K.Flush. Com'n " .... 55&10%

*Stove and Plow—*
Stove ..... 60%
Plow ..... 60&5%
R. B. & W., Plow ..... 55%

*Tire—*
Common, list Feb. 28, '83 ..... 65%
Port Chester Bolt and Nut Company:
Empire, list Feb 28, '83 ..... 65%
Keystone, Philadel., list Oct. '84 .... 80%
Norway, Phila., list Oct. '84 ..... 75%
American Screw Company:
Norway, Phil., list Oct. 16, '84 ..... 75%
Eagle, Phil., list Oct. 16, '84 ..... 80%
Philadel., list Oct. 16, '84 ..... 80%
Bay State, list Feb. 28, '83 ..... 65%
R.B.&W., Philadel., list Oct. 16, '84 .... 80%

### Borers, Tap.

Common and Rind ..... 20&10%
Ive's Tap Borers ..... 33⅓&5%
Enterprise Mfg. Co ..... 20&10@30%
Clark's ..... 33⅓@35%

### Borax ..... ₩ ℔ 9½@10½¢

### Boring Machines—See Machines, Boring.

### Bow Pins—See Pins, Bow.

### Boxes, Wagon.

Per ℔ ..... 2½¢

### Braces.—

American Bit Brace Co.:
Nos. 10, 12, 20 ..... 60&10%
Nos. 11, 21, 24, 27 ..... 70&10%
Nos. 22, 23, 25 ..... 60&10&5%
Nos. 13, 26, 36, 37 ..... 70&10&5%
Ball Braces, net ..... $1.12 to $1.25¢
Amidon's
Barker's Imp'd Plain ..... 75&10@80%
Barker's Imp. Nickeled ..... 65&10@70%
Ratchet ..... 75&10@80%
Eclipse Rachet ..... 60%
Globe Jawed ..... 40@40&10%
Corner Brace ..... 40@40&10%
Universal, 8 in., $2.10 10 in. ..... $2.25
Buffalo Ball ..... $1.10@$1.15
Barber's,
Nos. 10 to 16 ..... 50%
Nos. 30 to 33 ..... 50%
Nos. 40 to 68 ..... 50&10%
Saxton's,
Barker's Imp. Polished ..... 75&10@80%
Barker's Imp. Nickeled ..... 65&10@70%
Ratchet, Polished ..... 60&10@60%
Ratchet, Nickeled ..... 40&10@50%
Buffalo Ball ..... net, $1.10@$1.15
Bartholomew's,
Nos. 25, 27 and 30 ..... 50&10@60&5%
Nos. 117, 118, 119 ..... 70@70&5%
Common Ball, American ..... $1.00@$1.10
Fray's Genuine Spofford's .. 60&5@50&10%
Fray's No. 70 to 120, 81 to 123, 207 to 414 ..... 50&10%
Ives' New Haven Novelty ..... 70@70&5%
New Haven Ratchet ..... 60&5@60&10%
Barber Ratchet ..... 60&5@60&10%
Barbers ..... 60&5%
Spofford ..... 60&5@60&10%
Osgood's Ratchet ..... 40&10@50%
P. S. & W. Co., Peck's Patent ..... 60%

### Brackets—

Shelf plain, Sargent list, 55&10@55&10&10%
Shelf, fancy, Sargent s list, 60&10@60&10&10%
Reading, plain ..... 50&10@60&10&5%
Reading, Rosette ..... 60&10@60&10&10%

### Bright Wire Goods—See Wire.

### Broilers—

| Henis' Self-Basting. | Inch | 9 | 10 | 9x11 |
|---|---|---|---|---|
| | Per doz | $4.50 | 5.50 | 6.50 |

New Haven ..... 50%
Wire Goods Co ..... 65&10%

### Buckets, Well.

*Galvanized—*
Hill's ..... ₩ dos, 12 qt, $4.25; 14 qt, $5.25
Iron Clad ..... ₩ dos. 14 qt, $4.25@$4.50
Helwig's Flat Iron Band ..... $3.75
Helwig's Wired Top ..... ₩ dos $4.00

### Il Rings—See Rings, Bull.

### Butchers' Cleavers—See Cleavers Butchers'.

### Butts—

*Brass—*
Wrought Brass ..... 75&10@80%
Cast Brass, Tiebout's ..... 50%
Cast Brass, Corbin's, Fast ..... 33⅓&10%
Cast Brass, Loose Joint ..... 33⅓&10%

*Cast Iron—*
Fast Joint, Narrow ..... 50&10&5@60%
Fast Joint, Broad ..... 50&10@60%
Loose Joint ..... .70&10@75%
Loose Joint, Japanned ..... .70&10@75%
Loose Joint, Jap. with Acorns ..... .70&10@75%
Parliament Butts ..... .70&10@75%
Mayer's Hinges ..... .70&10@75%
Loose Pin, Acorns ..... .70&10@75%
Loose Pin, Acorns, Japanned ..... .70&10@75%
Loose Pin, Acorns, Japanned, Plated Tips ..... .70&10@75%

*Wrought Steel—*
Fast Joint, Narrow ..... .70&10@75%
Fast Joint, Lt. Narrow ..... .70&10@75%
Fast Joint, Broad ..... .70&10@75%
Loose Joint, Broad ..... .70&10@75%
Table Butts, Back Flaps, &c ..... .70&10@75%
Inside Blind, Regular ..... .70&10@75%
Inside Blind, Light ..... .70&10@75%
Loose Pin ..... .70&10@75%
Bronzed Wrought Butts ..... 50%

## Calipers—See Compasses.

### Calks, Toe—

Gautier, One Prong, Blunt ..... 5½@6¢
Burke's, One Prong, Blunt ..... 5½@6¢
Burke's, Two Prong, Blunt ..... 7½@8¢
Burke's, One Prong, Sharp ..... 6½@7¢

### Can Openers—See Openers, Can.

### Cards—List January 28, 1891.

Watson's Cotton, Wool, Horse and File ..... 25%

### Carpet Stretchers—See Stretchers Carpet.

### Carpet Sweepers—See Sweepers Carpet.

### Cartridges—See Ammunition.

### Casters—

| | | |
|---|---|---|
| Bed | Brass | 55@55&10% |
| Plate | Others | 60@60&10% |
| Shallow Socket | | |

Deep Socket ..... 40&10%
Yale Casters, list May, 1888 .... 30&10@40%
Yale, Gem ..... 60@60&5%
Martin's Patent (Phœnix) ..... 45&10@50%
Payson's Anti-friction ..... 60@60&10%
Giant Truck Casters ..... 30%
Stationary Truck Casters ..... 60&10%
Socket Truck Casters ..... 50%

### Cattle Leaders—See Leaders, Cattle.

### Cement.

Victor Elastic ..... 5 ℔ pails ₩ ℔ 5¢

### Chain—

Trace, Wagon and Fancy Chains, List revised April 21, 1890 ..... 60@60&5%

| American Coil, in cask lots, | 3-16 | ¼ | 5-16 | ⅜ | 7-16 | ½ | ⅝ | ¾ |
|---|---|---|---|---|---|---|---|---|
| | $7.75 | 5.45 | 4.55 | 4.00 | 3.65 | 3.50 | 3.40 | 3.30 |

Less than cask lots, add ½¢@½¢ ₩ ℔.
German Coil, list Oct. 6, 1890 .. 60@60&5%
German Halter Chain, list Oct 6, 1890 ..... 60@60&5%
Covert Halter ..... 60@60%
Covert Traces ..... 35@35%
Covert Heel Chain ..... 50@50%
Oneida Halter Chain ..... 60@60&5%
Galvanised Pump Chain ..... ₩ ℔ 5½@6¢
Jack Chain, Iron ..... 75&10@80%
Jack Chain, Brass ..... 75@75&10%

### Chalk—

White, case lots ..... ₩ gr 50¢
Red, case lots ..... ₩ gr 67¢
Blue, case lots ..... ₩ gr 75¢
See also Crayons.

### Chalk Lines—See Lines.

### Chisels—

*Socket Framing and Firmer.*
P. S. & W ..... .75 @ 75&10 %
New Haven ..... .75 @ 75&10 %
Witherby ..... .75 @ 75&10 %
Mix ..... .75 @ 75&10 %
Ohio Tool Co ..... .75 @ 75&10 %
Douglass ..... 75@75&5%
Buck Bros ..... 30%
Merrill ..... 60&10@60&10&5%
L. & I. J. White ..... 50@50&5%

*Tanged and Miscellaneous.*
Tanged Firmers ..... 40&10@50%
Butchers' ..... $4.75@$5.00
Spear & Jackson's ..... $5 to $
Buck Bros ..... 30%
Cold Chisels, ₩ ℔ ..... 15@16¢

**Chucks—**

Beach Pat.....each, $3.00.....20%
Morse's Adjustable,each, $7.00, 20@20&5%
Danbury.....each, $6.00, 30@30&5%
Syracuse, Bals Pat.....25%
Graham Patent.....33⅓%
Skinner's Patent Chucks.
Combination Lathe Chucks.....33⅓%
Universal Lathe Chucks.....40%
Independent Lathe Chucks.....40%
Drill Chucks.....15%
Union Mfg. Co.,
Victor.....$8.50, 25%
Combination.....40%
Universal.....40%
Independent.....40%

**Churns.**

Tiffin Union, each, 5 gal. $3.25; 7 gal., $3.75; 10 gal..$4 25.
McDermaid Star Barrel Churn, each, 6 gal., $2.60; 10 gal., $3.75; 15 gal., $5.00; 20 gal. $5.25.

**Clamps—**

R. I. Tool Co.'s Wrought Iron.....25%
Adjustable, Cincinnati.....15&10%
Adjustable, Hammers.....15%
Adjustable, Stearn's.....30@30&10%
Stearn's Adjustable Cabinet and Corner.....30@30&10%
Cabinet, Sargent's.....60&&10%
Carriage Makers', Sargent's.....70&10%
Carriage Makers', P., S. & W. Co..40&10%
Eberharn Mfg. Co.....40&5@40&10%
Parallel, C. H. Besly & Co.....25%
Warner's.....40&10@40&10&5%
Saw Clamps, see Vises. Saw Filers'.
Carpenters', Cincinnati.....25&10%

**Cleavers.**

*Butchers'.*

Bradley's.....25@30%
L. & I. J. White.....20&5%
Beatty's.....40@40&5%
New Haven Edge Tool Co.'s.....40%
P., S. & W.....33⅓&5@33⅓&10%
Foster Bros.....30%
Schulte, Lohoff & Co.....40@40&5%

**Clips—**

Norway, Axle, ¼ & 5-16.....55&5&5%
2nd grade Norway Axle, ¼ & 5-16 65&5%
Superior Axle Clips.....65%&5&70%
Norway Spring Bar Clips, 5-16..60&5&5%
Wrought-Iron Felloe Clips.....₩ lb, 5½¢
Steel Felloe Clips.....₩ lb, 6¢
Baker Axle Clips.....25%

**Cloth and Netting, Wire**—See Wire, &c.

**Cockeyes**.....50%

**Cocks, Brass.**

Hardware list.....50&2%

**Coffee Mills**—See Mills, Coffee.

**Collars, Dog, &c.**

Medford Fancy Goods Co.....40&10%
Embossed, Gilt, Pope & Steven's list 30&10%
Leather, Pope & Steven's list.....40%
Brass, Pope & Steven's list.. .....40%
Chapman Mfg. Company.....50&10@60%

**Combs, Curry.**

Fitch's.....50&10@50&10&10%
Rubber, per dos $10.00.....20%
Perfect.....50%
Kellogg's.....50&10
Sweet & Clark's.....50&10

**Compasses, Dividers, &c.—**

Compasses, Calipers, Dividers.70@70&10%
Bemis & Call Co.'s
Dividers.....60&5%
Compasses & Calipers.....50&5%
Wing and Inside or Outside.....50&5%
Double.....60%
(Call's Pat. Inside).....30%
Excelsior.....50%
J. Stevens & Co.'s.....25&10%
Starrett's
Spring Calipers and Dividers....25&10%
Lock Calipers and Dividers.....25%
Combination Dividers.....25%

**Coopers' Tools**—See Tools, Coopers'.

**Cord—**

*Sash.*

Common.....₩ lb 10@11¢
Patent, good quality.....₩ lb 13@13½¢
White Cotton Braided, fair..₩ lb 26 @ 27¢
Common Russia Sash.....₩ lb 13½¢
Patent " " .....₩ lb 15¢
Cable Laid Italian Sash.....₩ lb 22@23¢
Indian Cable Laid " .....₩ lb 13¢
Silver Lake—
A Quality, White, 50¢.....10&10&5%
A Quality, Drab, 55¢.....10&10&5%
B Quality, White.....28@30¢
B Quality, Drab.....31@33¢
C Quality, White (only).....26@27¢
Sylvan Spring, Extra Braided, White, 34¢
Sylvan Spring, Extra Braided, Drab, 30¢
Semper Idem, Braided, White.....30¢
Egyptian India Hemp, Braided.....25¢
Massachusetts, White .....21¢
Samson—
Braided, White Cotton, 50¢..30@30&5%
Braided, Drab Cotton, 55¢....30@30&5%
Braided, Italian Hemp, 55¢...30@30&5%
Braided, Linen, 80¢.....30@30&5%
Tate's Cot'n Braided, White,.....₩ lb 22¢

*Wire Picture.*

Braided or Twisted.....75&10%

**Corkscrews**—See Screws, Cork.

**Corn Knives and Cutters**—See Knives, Corn.

**Crackers, Nut—**

Table (H. & B. Mfg. Co.).....40%
Blake's Pattern.....₩ dos $2.00, 10%
Turner & Seymour Mfg. Co.....50%

**Cradles—**

Grain.....50&5&2@50&10&2%

**Crayons.**

White Crayons, ₩ gross .....10¢
D. M. Stewart Mfg. Co., Metal Workers, ₩ gr, $2.50.....25%
D. M. Stewart Mfg. Co., Rolling Mill, ₩ gr, $2.50.....25%
See also Chalk.

**Crow Bars**—See Bars, Crow.

**Curry Combs**—See Combs, Curry.

**Curtain Pins**—See Pins Curtain

**Cutters—**

*Meat.*

Dixon's ₩ dos.....40&5%

| Nos. | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| | $14.00 | $17.00 | $19.00 | $ 0.00 |

Woodruff's ₩ dos.....40&5%

| Nos. | | 100 | 150 |
|---|---|---|---|
| | | $15.00 | $18.00 |

Hales Pattern ₩ dos.....70@70&5%

| Nos. | 11 | 12 | 13 |
|---|---|---|---|
| | $37.00 | $33.00 | $45.00 |

American.....30%

| Nos. | 1 | 2 | 3 | 4 | B | 5 |
|---|---|---|---|---|---|---|
| Each | $5 | $7 | $10 | $25 | $50 | $60 |

Enterprise.....30%

| Nos. | 10 | 12 | 22 | 32 | 42 |
|---|---|---|---|---|---|
| Each | $3 | $2.50 | $4 | $6 | $15 |

Great American Meat Cutter.....30%

| Nos. | 112 | 116 | 118 | 120 | 122 |
|---|---|---|---|---|---|
| Each | $2.00 | $2.75 | $3.00 | $3.50 | $4.00 |

Miles' Challenge ₩ dos.....45@45&10%

| Nos. | 1 | 2 | 3 |
|---|---|---|---|
| | $32.00 | $30.00 | $40.00 |

Home No. 1.....₩ dos, $26.00, 55&10%
Draw Cut, each:

| Nos. | 5 | 6 | 8 |
|---|---|---|---|
| | $50 | $75 | $80 | $235 |

.....20@25%
Great American.....30%
Beef Shavers (Enterprise).....50&10@30%
Little Giant.....50%
Chadborn's Smoked Beef Cutter, ₩ dos $66.00

*Tobacco.*

Champion.....20&10@30%
Wood Bottom.....₩ dos $5.00@$5.25
All Iron.....₩ doz $4.25
Nashua Lock Co.'s..₩ dos, $18.00 50@55%
Wilson's.....55%
Sargents's.....₩ dos, $24, 55&10%
Acme.....₩ dos $20.00, 40%

*Washer.*

Smith's Pat.....₩ dos $12.00, 20&10&10%
Johnson's.....₩ dos $11.00, 33⅓%
Penny's.₩ dos Fol. $14; Jap'd, $16.00, 55%
Appleton's.....₩ dos $16.00, 60&10%
Bonney's.....30&10%
Cincinnati.....25&10%

# Dampers, &c—

Dampers, Buffalo.....40&10%
Buffalo Damper Clips.....40&10%
Crown Damper.....40%
Excelsior.....40&10%

**Diggers, Post Hole, &c.—**

Samson Post Hole Digger, ₩ dos $36.00, 25%
Fletcher Post Hole Augers, ₩ dos $36, 20%
Eureka Diggers.....₩ dos $12.50@14.00
Leed's.....₩ dos $8.00@9.00
Vaughan's Post Hole Auger, ₩ dos $13.00@14.00
Kohler's Little Giant.....₩ dos. $18.00
Kohler's Hercules.....₩ dos. 15.00
Kohler' New Champion.....₩ dos. $9.00
Schniedler.....₩ dos. $18.00
Ryan's Post Hole Diggers..₩ dos $24.00
Cronk's Post Bars, ₩ dos $60.00, 50&5&50&10%
Gibbs Post Hole Digger, ₩ doz $30.00, 50¢
Imperial, ₩ dos $15.....45%

**Dividers—**

See Compasses.

**Dog Collars**—See Collars, Dog, &c.

**Door Springs**—See Springs, Door.

**Drawers.**

Money, ₩ doz.....$18&$20

**Drawing Knives**—See Knives, Drawing.

**Drills and Drill Stocks—**

Blacksmiths'.....each $1.75
Blacksmiths' Self-Feeding, each $7.50,20%
Breast, P. S. & W.....40@10%
Breast, Wilson's.....30&5%
Breast, Millers Falls.....each $3.00, 25%
Breast, Bartholomew's....each $2.50, 25&10@40%
Ratchet, Merrill's.....20@20&5%
Ratchet, Ingersoll s.....25%
Ratchet, Parker's.....30@20&5
Ratchet, Whitney's.....20&10%
Ketchet, Weston's.....20@25%
Ratchet, Moore's Triple Action...25@30%
Ratchet, Curtis & Curtis.....30%
Whitney's Hand Drill, Plain, $11.00; Adjustable, $12.00.....20&10%
Wilson's Drill Stocks.....10%
Automatic Boring Tools....$1.75@$1.85

*Twist Drills—*

Morse.....50&10&5%
Standard.....50&10&5%
Syracuse (Metal list).....50&10%
Cleveland.....50&10&5%
Williams.....50&10&10%
New Process.....50&10&5%
Graham's Pat. Groove Shank 50&10&5%

**Drill Bits.**—See Augers and Bits.

**Drill Chucks.**—See Chucks.

**Dripping Pans**-See Pans, Dripping.

**Drivers, Screw.**

Douglas Mfg. Co.....20@20&10%
Disston's.....50%
Buck Bros.....30%
Stanley R. & L. Co.'s
Varnished Handles.....65&10%
Black Handles.....60&10%
Sargent & Co.'s
No. 1 Forged Blade.....60&10&10%
Nos. 20, 30 and 60. .....60%&10&10%
P. S. & W.....70 %
Knapp & Cowles'
No. 1.....60&20@70%
No. 2.....60&10&10@70&5%
No. 3.....60&5@60&10%
Nos, 4 and 00, Acme and Ideal..50& 5@50&10&5%
Stearns'.....25&10&5%
Gay & Parsons.....30%
Champion.....25&10%
Clark's Pat.....30@33⅓%
Crawford's Adjustable.....30%
Ellrich's Socket and Ratchet..25@25&10%
Allard's Spiral, new list.....25%
Kolb's Common Sense ₩ dos $6.00,25&10%
Syracuse Screw-Driver Bits....30&30&5%
Screw-Driver Bits.....₩ dos. 50@75¢
Screw-Driver Bits, Parr's.....₩ gro $6.25
Fray's Hol. Hdle. Sets. No. 3. $12.00, 25@25&10%
P. D. & Co.'s all Steel.....50%
Cincinnati.....25&10%
Brace Screw Drivers.....25&10%
Buck Bros.' Screw-Driver Bits ....

# Egg Beaters.—See Beaters, Egg.

**Egg Poachers.**—See Poachers, Egg.

**Electric Bell Sets.**—See Bells, Electric.

**Emery.**— No. 4 to No. 54 to Flour, CF

| | 46 gr. | 150 gr. | F. FF. |
|---|---|---|---|
| Kegs, ₩ lb | 4½¢ | 5 ¢ | 2½¢ |
| ½ kegs, ₩ lb | 4½¢ | 5½¢ | 2½¢ |
| ¼ kegs, ₩ lb | 5 ¢ | 5½¢ | 3 ¢ |
| 10-lb cans, 10 in case | 6 ¢ | 6½¢ | 5 ¢ |
| 10-lb cans, less than 10 | 10 ¢ | 10 ¢ | 7½¢ |

**Enameled and Tinned Ware**—See Ware, Hollow.

**Escutcheon Pins**—See Pins, Escutcheon.

**Escutcheons.**

Door Lock....Same dis as Door Locks.
Brass Thread.....60@60&10%
Wood .....25%

**Expanded Metal.**

List No. 5.

Lathing.....10%
Fencing, Painted Sheets.....20%
Netting, Painted Sheets.....20%
Door Mats, Galvanized.....25%
Window Guards, Paneled.....15%
Tree Guards, Paneled.....15%

# Fasteners, Blind—

Mackrell's, ₩ doz. $1.00.....20@20&10%
Van Sand's Screw Pat., $15 ₩ gr..60&10%
Van Sand's Old Pat., $15.00 ₩ gr..55&10%
Washburn's Old Pattern, ₩ gr.....$9.00
Merriman's.....new list
Austin & Eddy No. 2008 ₩ gr.....$9.00
Security Gravity, ₩ gr.....$9.00

**Faucets.—**

Fenn's.....40%
Bohren's Pat. Rubber Ball.....25%
Fenn's Cork Stops.....33⅓%
Star.....60%
Frary's Pat. Petroleum.....40&5&2%
B. & L. B. Co.
West's Lock, Open and Shut Key...50%
Star, Metal Plug, new list.....40%
Lockport, Metal Plug, reduced list..60%
Metallic Key, Leather Lined....60&10@ 60&10&10%
Cork Lined.....70&5@70&10%
Burnside's Red Cedar.....50%
Burnside's Red Cedar, bbl lots....50&10%
John Sommers'
Peerless Best Block Tin Key.....40%
IXL, 1st quality, Cork Lined.....50%
Diamond Lock.....40%
Perfection, Fla. Red Cedar.....50%
Goodenough Cedar.....50%
Boss Metallic Key.....50%
Reliable Cork Lined.....60%
Western Pattern Cork Lined.....50%
Self-Measuring
Enterprise, ₩ dos $50.00.....20&10%
Lane's, ₩ dos $36.00.....25&10%
Victor, ₩ dos $36.00.....25&10%

**Felloe Plates**—See Plates, Felloe.

**Fifth Wheels.—**

Derby and Cincinnati.....45&5%
Brewster.....50&5%

**Files—**

*Domestic—*

Nicholson Files, Rasps, &c.
60&10@60&10&5%
Nicholson (X. F.) Files.....25%
Nicholson's Royal Files (Seconds)....75% (extra prices on certain sizes)
G. & H. Barnett (Black Diamond).....60&10@60&10&5%
Eagle.....60&10&5@60&10@10%
Other makers, best brands60&10@60&20%
Fair brands.....60&10&10@70&5%
Second quality.....70&10@75&10%
Heller's Horse Rasps.....50&7½@50&10%
McCaffrey's Horse Rasps.....50&10%
Chelsea Horse Rasps, Hand Cut...50&10%

*Imported—*

Moss & Gamble....List, April 1, 1883, 15%
Butcher.....Butcher's list, 20%
Stubs.....Stubs list, 25@30%
Turton's.....Turton's list, 20@25%
Greaves' Horse Rasps..American list, 60%

**Fixtures.**

*Grindstone—*

Sargent's Patent.....70&10%
Reading Hardware Co.....30&10%
P., S. & W. Co.....50&10%

**Fluting Machines**—See Machines, Fluting.

**Fluting Scissors**—See Scissors, Fluting.

**Fodder Squeezers**—See Squeezers, Fodder.

**Forks—**

Hay, Manure, &c., Asso List.65&5@65&10%
Hay, Manure, &c., Phila. List. 60@60&5% Plated, see Spoons.

**Frames—**

*Saw—*

White Vermont.....₩ gro $9.00@10.00
Red, Polished and Varnished.....₩ doz $1.50, 25%

*Screen, Window and Door—*

Porter's Pat. Window and Door Frame. 33⅓&10%
Warner's Screen Corner Irons...33⅓@ 33⅓&10%
Stearns' Frames and Corners..25@25&10%
Cortland.....40@40&5%

**Freezers, Ice Cream—**

White Mountain.....60@60&5%
Granite State.....65@65&5%
Arctic.....70@70&5%
American.....60%
Buffalo Champion.....65@65&5%
Shepard's Lightning.....65@65&5%
Gem.....65%
Blizzard.....70%
Double Action Crown.....60%
Crown.....60%
Star.....60%
Peerless.....60&10%
Giant.....60%
Zero.....60&10&10%
Boss and Pet.....60&10&10&10%
Keystone, P. D. & Co., each, $1.50.....20%

**Fruit and Jelly Presses**—See Presses, Fruit and Jelly.

**Fry Pans**—See Pans, Fry.

**Funnels.**

Gersdorff's Perfection, Standard and Globe; *Tin*, 1 gro., 10%; 2 to 5 gro., 20%; 5 to 10 gro.....30%
*Copper*, 1 to 6 doz., 15%; 6 to 12 doz., 20%; over 12 doz.....35%

**Furnaces, Soldering.**

Burgess No. 3 Gem, tin reservoir....$7.00
Burgess No. 3 Gem, copper reservoir, 8.50

**Fuse**— ₩ 1000 ft.

Common Hemp Fuse, for dry ground..$2.70
Common Cotton Fuse, for dry ground 2.85
Single Taped Fuse, for wet ground.. 3.35
Double Taped Fuse, for very wet gr. 4.35
Triple Taped Fuse, for very wet gr.. 5.00
Small Gutta Percha Fuse, for water. 7.50
Large Gutta Percha Fuse, for water.12.00

# Gates, Molasses—

Stebbin's Pattern.....75&10&5@30%
Stebbin's Genuine.....60&10&10%
Stebbin's Tinned Ends.....40&10%
Chase's Hard Metal.....50&10%
Bush's.....30%
Lincoln's Pattern.....70@70&10%
Weed's.....30&10%
Boss, ₩ doz:
No. 1, $7; No. 2, $8; No. 3, $9; No. 4, $10.....60&10&10%

**Gauges.**

Marking, Mortise, &c.....60&10%
Starrett's Surface, Center and Scratch. 25&10%
Wire, low list.....10&10%
Wire, Wheeler, Madden & Co .....10%
Wire, Morse's.....20%
Wire, Brown & Sharpe's.....10@20%
Wire, P. S. & W. Co.....10&10%

**Gimlets—**

Nail and Spike.....60&10&5%
"Eureka" Gimlets.....40&10%
"Diamond" Gimlets.....₩ gr $5.00
Double Cut, Shepardson's.....45@45&5%
Double Cut, Ives'.....60@60&5%
Double Cut, Douglass'.....40&10%
"Bee," ₩ gr $12.....35@35&5%

**Glue—**

Le Page's Liquid.....25@25&2½%
Upton's Liquid.....35%
Improved Process.....25@25&5%

**Glue Pots**—See Pots, Glue.

**Grease, Axle.**

Fraser's.....Keg ₩ lb 4¢, Pail ₩ lb 5¢
Fraser's, in boxes.....₩ gr $2.50
Dixon's Everlasting, in Bxes..₩ doz 1 lb $1.20; 2 lb $2.00
Dixon's Everlasting....10-lb pails, ea. 25¢
Lower grades, special brands, ₩ gr $5.50@$7.00

**Grindstones—**

Small, at factory.....₩ ton $7.50@9.00
Family, Cleveland Stone Co.....20%

**Grindstone Fixtures**—See Fixtures Grindstone.

# Hack Saws—See Saws.

**Hafts, Awl.**

Sewing, Brass Fer.₩ gr, $3.50.....45&10%
Pat. Sewing, Short.$1.00 ₩ doz.....40&10%
Pat. Sewing, Long.....₩ doz $1.20
Pat. Peg, Plain Top.₩ gr $10.00...45&10%
Pat. Peg, Leather Top.₩ gr $12.00..45&40%

**Halters.**

Covert's, Rope, ½ in. Jute..... 50&2%
Covert's, Rope, ½ in. Hemp .....50&2%
Covert's Adj. Rope Halters .....40&2%
Covert's Hemp Horse and Cattle Tie, 50&2%
Covert's Jute Horse and Cattle Ties, 60&10&2%
Covert's Adj. Web Halters .....35&2%

**Hammers—**

*Handled Hammers—*

Maydole's, list Dec. 1, '85.....25&10%
Buffalo Hammer Co.
Humason & Beckley
Atha Tool Co.
C. Hammond & Son
Verree.
} 50@50&10%
Fayette R. Plumb.
"Artisans' Choice," A E Nail.40&12½
Regular "Y. & P." A. E. Nail ....50
Horseshoe Turning Hammers ....50
Other Hammers .....50&10%
Hartford, Nail Hammers.....40&5%
Hartford Machinists, &c...50&5@50&10%
Magnetic Tack, Nos. 1, 2, 3, $1.25, 1.50 & 1.75.....30&10%
Nelson Tool Works.....40&10%
Warner & Nobles.....20@20
Peck, Stow & Wilcox .....40%
Sargent's.....35⅓&10%

*Heavy Hammers and Sledges—*

3 lb and under.. ....₩ lb 40¢
3 to 5 lb.....₩ lb 36¢ } 70@70&10%
Over 5 lb.....₩ lb 30¢
Wilkinson's Smiths.....10½¢@11¢₩ lb

**Handcuffs and Leg Irons**—See Police Goods,

**Handles—**

Atkins' No. 1 Loop, ₩ pair, 22¢; No. 13¢; No. 6, 16¢; No. 2 and No. Reversible, 18¢.

*Cross-Cut Saw Handles—*

Boynton's Loop Saw Handles, 50¢....80%
Champion.....15%

*Iron, Wrought or Cast—*

Door or Thumb.

| Nos. | 0 | 2 | 3 |
|---|---|---|---|
| Per doz. | $0.90 | 1 00 | 1.15 | 1.35 | 1.50 |

.....80&10&10%

Boggin's Latches.....₩ doz 30c@35c
Bronze Iron Drop Latches..₩ doz 70¢ net
Jap'd Store Door Handles—Nuts, $1.62; Plate, $1.10; no Plate, $0.88 .....net
Barn Door, ₩ doz $1.40.....10&10%
Chest and Lifting.....70%

*Wood—*

Saw and Plane.....40&10@40&10&5%
Hammer, Hatchet, Axe, Sledge, &c...40%
Brad Awl.....₩ gr $2.00
Hickory Firmer Chisel, ass'd. ₩ gr 4.50
Hickory Firmer Chisel, large. ₩ gr 5.00
Apple Firmer Chisel, ass'd... ₩ gr 5.00
Apple Firmer Chisel, large...₩ gr 6.00
Socket Firmer Chisel, ass'd..₩ gr 5.00
Socket Framing Chisel, ass'd. ₩ gr 5.00
J. S. Smith & Co.'s Pat File.....50-10%
File, assorted..... ₩ gr 7 75
Auger, assorted.....₩ gr 5.00 } .....50%
Auger, large..... ₩ gr 7.00 }
Pat. Auger, Ives'.....30&10%
Pat. Auger, Douglass..... ₩ set $1.25
Pat. Auger, Swan's..... .....₩ set $1.00
Hoe, Rake, Shovel, &c..... ....50&10%

**Hangers—**

Barn Door, old patterns...60&10&10@70%
Barn Door, New England....60&10&10@70
Samson Steel Anti-Friction.....55%
Orleans Steel.....55%
Hamilton Wrought Wood Track.....55%
U. S. Wood Track .....65%
Champion.....60&10%
Rider and Wooster, Medina Mfg. Co.'s list.....70%
Climax Anti-Friction.....55%
Climax Anti-Friction for Wood Track55%
Zenith for Wood Track.....55%
Reed's Steel Arm.....50%
Challenge, Barn Door.....50%
Sterling.....50@50&10%
Victor, No. 1, $15.00; No. 2, $16.50; No. 3, $18.00.....50&2%
Cheritree.....50&10%
Kidder's.....50&10@60%
The Boss.....60&10%
Best Anti-Friction.....60&10%
Duplex (Wood Track).....60&10&5%
Terry's Pat., ₩ dos pr. 4 in, $10.00; 5 in. $12.00.....50@10%
Terry's Steel Anti-Friction Leader 50&10%
Terry's Steel Anti-Friction Ideal..50&10%
Cronk's Patent, Steel Covered.....50@5%
Wood Track Iron Clad, ₩ ft. 10¢...50 &15@60%
Carrier Steel Anti-Friction.....50&10%
Architect, ₩ set $6.00.....20%
Eclipse.....20&10%
Felix, ₩ set $4.50.....20%
Richards'.....30@30&10%
Lane's Standard.....50&5@50&10%
Lane's New Standard.....50@50&5%
Ball Bearing Door Hanger..20&10@25&10%
Warner's Pat.....20&10@20&10%
Stearns' Anti-Friction.20&10@20&10&10%
Stearns' Challenge.....25&10@25&10&10%
Faultless.....40@40&5%
American, ₩ set $6.00.....20&10%
Rider & Wooster, No. 1, 62½¢; No. 2, 75¢.....40%
Paragon, Nos. 1, 2 and 3.....40&10%
Cincinnati.....25&10%
Paragon, Nos. 5, 5¼, 7 and 8.....20&10%
Crescent.....60@60&10%
Nickel Cast Iron.....50%
Nickel, Malleable Iron and Steel .....40%
Scranton Anti-Friction Single Strap33⅓%
Wild West, 4 in. Wheel, $15.00; 5 in. Wheel, $21.00.....45%
Star.....40@40&10&5%
May .....50&5@50&10%
Barry, $6.00.....40&10%
Interstate.....50%
Magic.....45%

**Harness Snaps**—See Snaps.

**Hatchets—**

American Axe and Tool Co.
Blood's.....
Hunt's.....
Hurd's.....
Mann's.....
Peck's.....
Underhill's..... } 40 & 10 @ 50&5 %
Buffalo Hammer Co.....
Fayette R. Plumb.....
C. Hammond & Son.....
Keily's.....
Sargent & Co.....
P., S. & W. Co.....
Ten Eyck Edge Tool Co.....
Collins.....10%
Schulte, Lohoff & Co.....50@50&5%

**Hay and Straw Knives**—See Knives.

**Hinges—**

*Blind Hinges—*

Parker.....75&2%
Palmer.....50&5&10%
Seymour .....70&2%
Huffer .....50%
Clark's, Nos. 1, 3, 5, 40 and 50 .....75&10&5@80%
Clark's Mortise Gravity.....80%
Sargent's, Nos. 1, 3, 5, 11, 13 .....75&10@55&10&5%
Sargent's, No. 12.....77&10&10%
Reading's Gravity.....75&10@75&10&5%
Shepard's
Noiseless.....75&10%
Niagara.....80%
Buffalo.....80%
Clark's Genuine Pattern.....80%
O. S., Lull & Porter .....75&10%
Acme, Lull & Porter .....75%
Queen City Reversible....70&10&5@75%
Clark's Lull & Porter, Nos. 0, 1, 1¼, 2, 2½, 3.....75&10&2½%
North's Automatic Blind Fixtures, No. 2, for Wood, $0.00; No. 3, for Brick, $11.50.....10%

*Gate Hinges—*

Western.....₩ dos $4.40, 60%
N. E.....₩ dos $7.00, 55%
N. E. Reversible.....₩ dos $5.20, 55&10%
Clark's, Nos. 1, 2, 3.....60&10&5%
N. Y. State.....₩ dos $5.00, 55&10%
Automatic.....₩ dos $13.50, 50%
Common Sense.....₩ dos pair $4.50, 50%
Seymour's.....45&10%
Shepard's.....60&10&5%
Reed's Latch and Hinges. ₩ dos $12.00, 50%

*Spring Hinges—*

Union Spring and Blank Butts.....40%
Sear's Spring Hinge Co.'s list, March 1886 .....20%
Acme.....30%
J. S.....25&10%
Empire and Crown.....20%
Hero and Monarch.....55%
American, Gem, and Star.....30%
Oxford.....20%
Barker's Double Acting.....25%
Union Mfg. Co.....25%
Bommer's.....30%
Buckman's.....15@20%
Chicago.....30%
Wiles'.....10%
Devore's.....40%
Rex.....40%
Royal.....60%
Reliable.....60%
Champion.....60%
Bardsley's Patent.....40%
Stearn's.....50&10%
Niagara, Holdback pattern, per gross, .....$14.00

*Wrought Iron Hinges*
List February 14, 1891.

Strap and T.....50&10%
Corrugated Strap and T.....50 & 10 %
Screw Hook and Strap..... { 6 to 12 in., ₩ D. 4¢ / 14 to 20 in., ₩ D.3½¢ / 22 to 36 in., ₩ D. 3¢
Screw Hook and Eye..... { ⅛ in., ₩ D 7½¢ / ¼ in., ₩ D 5½¢ / ⅜ in., ₩ D 4½¢
Rolled Blind Hinges, Nos. 32 and 34 .....50&10%
Rolled Blind Hinges, Nos. 232 and 234 .....55&10%
Rolled Plate.....70&10%
Rolled Raised.....70&10%
Plate Hinges { 8, 10 & 12 in., ₩ D .....5¢ / "Providence" { over 12 in., ₩ D.....4¢

**Hoes—**

*Eye—*

D. & H. Scovil.....20%
Lane's Crescent Planters Pattern..45&5%
Lane's Razor Blade, Scovil Pattern...30%
Maynard, S. & O. Pat.....45&5%
Sandusky Tool Co., S. & O. Pat. } 50&10&5 @60%
Am. Axe and Tool Co., S. & O. Pat. }
Chattanooga Tool Co., S. & O. Pat..60& 5@60&10%
Grub.....60&10%

*Handled—*

Garden, Mortar, &c.....65&5@65&10%
Planter's, Cotton &c.....65&5@65&10%
Warren Hoe.....60%
Magic ... .....₩ dos $4.00

**Hog Rings and Ringers**—See Rings and Ringers.

**Hoisting Apparatus**—See Machines, Hoisting.

**Hollow-Ware**—See Ware, Hollow.

**Holders.**

*Bag.*

Sprengle's Pat.....₩ dos $18.....60%

*Bit.*

Extension,
Barber's, ₩ dos $15.00.....40@40&10%
Ives, ₩ doz $20.00.....60&5@60&10%
Diagonal.. .....₩ dos $24.00, 40%
Angular.....₩ dos $24.00, 40&5%

*File and Tool—*

Bals Pat.....₩ dos $4.00; 25%
Nicholson File Holders.....20%
Dick's Tool Holder.....20%

**Hooks—**

*Cast Iron—*

Bird Cage, Sargent's list..... } 60&10&10%
Bird Cage, Reading..... }
Clothes Line, Sargent's list.. }
Clothes Line, Reading list. 60&10@60&10&10%
Ceiling Sargent's list.....55&10&10%
Harness, Reading list..55&10@55&10&10%
Coat and Hat, Sargent's list. 55&10@60&10%
Coat and Hat, Reading.50&10@50&10&10%

*Wrought Iron—*

Cotton.....₩ dos $1.25
Cotton Pat. (N.Y. Mallet & Handle W'ks). 30%
Tassel and Picture (T. & S. Mfg. Co.)..50%
Wrought Staples, Hooks, &c. See Wrought Goods.

*Wire—*

Wire Coat and Hat, Gem, list April, 1886.....60%
Wire Coat and Hat, Miles', list April, 1886.....50%
Indestructible Coat and Hat.....45%
Wire Coat and Hat, Standard.....60%
Handy Hat and Coat.....50&10%
Steady Ceiling Hooks.....50&10%
Belt.....80@80&10%
Atlas, Coat and Hat.....60%

*Miscellaneous.*

Grass, No. 2, $2.00; No. 3, $2.25; No. 4, $2.50
Nolin's Grass.....₩ dos $2.25
Bush.....55@60%
Whiffletree—Patent.....55%
Hooks and Eyes—Malleable Iron. 70@70&10%
Hooks and Eyes—Brass.....60&10&10%
Fish Hooks, American.....50%
Bench Hooks .....See Bench Stops.

**Horse Nails**—See Nails, Horse.

**Horse Shoes**—See Shoes, Horse.

**Hose, Rubber—**

Competition.....75@75&5%
Standard.....60&10&5@60&10&10%
Extra.....50&10@60%
N. Y. B. & P. Co., Para.....25&5%
N. Y. B. & P. Co., Extra.....10@40&5%
N. Y. B. & P. Co., Dundee....50&10 @ 60%

**Huskers—**

Blair's Adjustable.....₩ gr $8.00
Blair's Adjustable Clipper.....₩ gr 7.00
Hubbard's Solid Steel.....₩ gr 4.50

**Indurated Fiber-Ware**—See Ware, Indurated Fiber.—

**Irons.**

*Sad—*

From 4 to 10, at factory....₩ 100 ℔, $2.30@$2.40
Self-Heating.....₩ doz $9.00 net
Self-Heating, Tailors'....₩ doz $18.00 net
Mrs. Pott's Irons.....50&5%
Enterprise Star Irons.....50&5%
XX Cold Handle Sad Iron .....50&5%
Ideal Irons new list.50&10@60 & 10&10%
Salamander, Irons.....25%
B. B. Sad Irons, ₩ ℔.....3 @3½¢
Combined Fluter and Sad Iron, ₩ dos, $15.00 .....15%
Fox Reversible, Self-Fluter ₩ dos $24.00
Chinese Laundry (N.E. Butt Co.) 8½¢, 15%
New England.....5¢, 15%
Mahony's Troy Pol. Irons.....25%
Sensible, list Jan. 91..... .....50&10&5%
Sensible Tailor's Irons.....33⅓%
National Self-Heating.....30%

*Soldering—*

Soldering Coppers..... ₩ ℔ 22 @ 23¢
Covert's Adjustable, list Jan. 1 1886. 35&2%

**Irons, Pinking, per dos., 65¢.**

**Jack Screws**—See Screws.

**Jacks, Wagon.**

Daisy.....33⅓%
Victor.....33⅓%

**Kettles—**

Brass, Spun, Plain, list Jan. 1, '91..25&5%
Brass, Spun, Pld. W.M. list Jan. 1, '91.20%
Enameled and Tea—See Hollow Ware.

**Keys—**

Lock Asso'n list Dec. 30, 1886...50&10@ 60&5%
Eagle, Cabinet, &c.....33⅓&2%
Hotchkiss' Brass Blanks.....40%
Hotchkiss, Copper and Tinned.....40%
Hotchkiss' Pad. and Cab.....35%
Ratchet Bed Keys.....₩ dos $4.00, 15%
Wollensak Tinned.....50&10%

**Knife Sharpeners**—See Sharpeners, Knife.

**Knives.**

*Butcher, Shoe, &c—*

Wilson's Butcher Knives, List Dec. 8, 1890 .....25%
Ames' Butcher Knives.....25%
Foster Bros.' Butcher, &c.....40%
Jordan's AAA1, Butchers', list.. net
Nichols' Butcher Knives.....40&10%
W. W. Wilson, Butcher, 6 in., $2.00; 7 in., $2.70; 8 in., $3.80, &c.
Ames' Shoe Knives.....20@25%
Ames' Bread Knives. ₩ dos $1.50, 15@20%
Moran's Shoe and Bread.....20%
Hay and Straw.....See Hay Knives.
Table and Pocket.....See Cutlery.
Corn, Auburn Mfg. Co. Western Pat., $3.00
Corn Auburn Mfg. Co. Crescent....$3.50

*Corn—*

Bradley's.....10%
Wadsworth's.....25%

*Drawing—*

Witherby..... } .75@ 75&10 %
P. S. & W..... }
Mix ..... }
New Haven..... }
Merrill.....60&10@60&10&5%
Douglas .....75@75&5%
Watrous.....15&10@25%
L. & J. White.....20&5%
Bradley's.....35%
Adjustable Handle.....25@33⅓%
Wilkinson's Folding.....25@25&5%

*Hay and Straw—*

Lightning. Mfrs'. price ₩ dos $18.00, 25% But jobbers cut this price freely, often selling at $8 @ $8.50.
Wadsworth's.....40&7½@40&10%
Carter's Needle.....₩ dos $11.00@$11.50
Heath's.....₩ dos $13.00@13.50
Auburn Hay, Com. and Spear Point..50%
Auburn, Straw.....40%
Nolin's Hay .....₩ doz.$7.00 @ $8.00

*Mincing.*

Am. (2d quality), ₩ gr., 1 blade, $7; 2 blades, $12; 3 blades, $18.....net
Lothrop's.....20&10%
Smith's, ₩ doz, Single, $2.00; Double, $3 .....40@45%
Knapp & Cowles.....50&10@60%
Buffalo Adjustable.....₩ dos $3.00 .25%
Buffalo Double Adj'table.₩ dos $3.00 25%

**Knobs—**

Door Mineral.....60@65%
Door Por. Jap'd.....70@75%
Door Por. Nickel.....$2.00@2.25
Door Por. Plated, Nickel.....$2.00@2.25
Drawer, Porcelain.....60&10@60&10&10%
Hemacite Door Knobs.....40&10@50%
Yale & Towne Wood, list Dec., 1885...40%
Furniture Plain.....75¢ gro inch, 10%
Furniture, Wood Screws.....35&10%
Base, Rubber Tip.....70&10&5%
Picture, Judd's.....60&10&10@70%
Picture, Sargent's.....70&10%
Picture, Hemacite.....35&5%
Shutter, Porcelain.....65&10%
Carriage, Jap.....₩ gro 80¢, 60&10%
Bardsley's Wood Door, Shutter, &c..40%

**Ladles.—**

Melting, Sargent's.....55&10%
Melting, Reading.....35&10%
Melting, Monroe's Pat..₩ dos $4.00, 40%
Melting, P. S. & W.....35&10@40%
Melting, Warner's.....30%

**Lanterns—**

*Tubular—*

Plain with Guards, ₩ doz.....$3.75@4.00
Lift Wire, with Guards.....$4.00@4.25
Square Plain, with Guards....$3.75@4.00
Sq. Lift Wire, with Guards..... .....$4.50

*Police Lanterns (including packages).*

2¾-inch Bull's-eye Police regular..... ₩ dos $3.00
3-inch Bull's-eye Police regular ..... ₩ dos $3.00
2¾-inch Bull's-eye Police flash light .... ₩ dos $4.00
3-inch Bull's eye Police flash light..... ₩ dos $4.50

**Lawn Mowers**—See Mowers, Lawn.

**Leaders, Cattle.**

Humason, Beckley & Co.'s.....70%
Sargent's.....66⅔&10%
Hotchkiss.....30%
Peck, Stow & W. Co.....60&10%

**Lemon Squeezers**—See Squeezers, Lemon.

**Lifters, Transom.**

Wollensak's:
Class 3 and 4, Bronzed Iron.....50%
Class 3 and 4, Bronze Metal.....25%
Class 3 and 4, Brass.....35%
Skylight Lifters.....35%
Crown, Eagle and Shield.....50%
Reiher's, list Feb. 20, 1891.
Bronzed Iron Rods.....50&10&10&2%
Brass, Real Bronze or Nickel Plate..30%
Excelsior.....50&10&2½
Shaw's.....50&10%
Payson's:
Universal.....60%
Solid Grip.....60%
Imperial.....50&10%

**Lines—**

Cotton and Linen Fish, Draper's.....50%
Draper's and Tate's Chalk.....50%
Draper's Masons' Linen, 84 ft., No. 1, $1.35; No. 2, $1.75; No. 3, $2.25; No. 4, $2.75; No. 5, $3.25.....25%
Cotton Chalk.....55%
Samson Cotton, No. 4, $2; No. 4½, $2.50; 10%
Silver Lake, Braided, No. 0; No. 1, $6.50; No. 2, $7.00; No. 3, .50 ₩ gro.....25%
Mason's Linen, No. 3½, $1.50; No. 4, $2.00; No. 4½, $2.50.
Mason's Colored Cotton.....45%
Wire Clothes.. Nos. 12 10 20
100 ft. ..... $4 00 $3 50 $3.00
Ventilator Cord, Samson Braided, White or Drab Cotton..₩ dos $7.50, 20%

**Locks, &c.—**

*Cabinet—*

Eagle, Gaylord Parker and Corbin... } List March, '84, rev Jan.1,'85..33⅓&2%
Deltz, Nos. 36 to 39.....40%
Deltz, Nos. 51 to 63.....40&10%
Deltz, Nos. 86 to 96.....30%
Stoddard Lock Co.....30&33⅓%
"Champion" Night Latches.....40%
Barnes Mfg. Co.....40@40&10%
Eagle and Corbin Trunk.....25&2%
"Champion" Cab. and Combin...33⅓&
Yale.....net prices
Romer's.....25%

*Door Locks, Latches, &c.*

R. & E. Mfg. Co. ,list Mar.20, 1889..... } 65&10@7 % Much lower net prices often made.
Mallory, Wheeler & Co., list July, '88.....
Sargent & Co., list Aug. 1, '83
Reading Hardware Co., list Feb. 2, '88.....
Brittan, Graham & Mathes, list Jan. 1890.....60&10&10%
Perkins' Burglar Proof.....60&25%
Plate.....33⅓&2%
Barnes Mfg. Co.....40@40&10%
Yale.....net prices
Deltz Flat Key.....30%
L. & C. Round Key Latches.....30&10%
L. & C. Flat Key Latches.....33⅓&10%
Romer's Night Latches.....15%
Brooklyn Latches.....50&10%
Shepardson or U. S.....35%
Seed's N. Y. Hasp Lock.....35%

*Padlocks—*

List June 10, 1891.....50&2½
Yale Lock Mfg. Co.'s.....net prices
Eagle.....25&2%
Eureka, Eagle Lock Co.....40&2%
Romer's, Nos. 0 to 91.....30%
Romer's Scandinavian, &c., Nos. 100 to 500..15%
A. E. Deltz.....40%
Champon Padlocks.....40%
Hotchkiss.....30%
Star.....45%
Horseshoe.....₩ dos, $9. 40@40&10%
Barnes Mfg. Co.....40@40&10%
Nock's.....30%
Brown's Pat.....25%
Scandinavian.....90@90&10%
E. T. Fraim's Keystone Scandavian. Nos. 119, 120, 130 and 140.....90&10%
Other Nos.....65%
Ames Sword Co. up to No. 150.....40%
Ames Sword Co. above No. 150.....50%
Slaymaker Barry & Co.
No. 1010 line.....35&5%
No. 41 line.....45&10%
No. 61 line.....50&2%
No. 21 line.....75%

*Sash, &c.*

Clark's, No. 1, $10; No. 2, $8 ₩ gr.. .33⅓%
Ferguson's.....33⅓%
Morris and Triumph, list Aug. 16, 1886. 60&2%
Victor.....60&10&2%
Walker's.....10%
Attwell Mfg. Co.....25&33⅓%
Reading.....65&10@60%&10&10%
Hammond's Window Springs.....40%
Common Sense, Jap'd, Cop'd and Br'zed.....₩ gr $4.00
Common Sense, Nickel Plated ₩ gr $10.00
Universal.....30%
Kemphall's Gravity.....60%
Kemphall's Model.....60@60&10%
Corbin's Daisy, list Feb. 15, 1886...70%
Payson's Perfect..... 60@60&10%
Hugunin's Sash Balances.....25&5&2%
Hugunin's New Sash Locks.....25&5&2%
Stoddard "Practical".....10%
Ives' Patent.....60&10@60&10&5%
Liesche's, No. 100, ₩ gr $8; 105, $10..30%
Davis, Bronze, Barnes Mfg. Co.....30%
Champion Safety, list March 1, 1888 55@55&5%
Security.....70%
Buckeye.....₩ gro $4.80

**Lumber Tools**—See Tools, Lumber

**Lustre—**

Four-ounce Bottles....₩ dos, $1.75; ₩ gross.....$17.00

**Machines.**

*Boring—*

| | Without Augers. | Upright. | Angular. | |
|---|---|---|---|---|
| Douglas..... | $5.50 | $6.75 | ..... | 30% |
| Snell's, Rice's Pat. | 5.50 | 6.75 | 4.40&10&10% | |
| Jennings ..... | 5.50 | 6.75 | 4.45@45&10% | |
| Other Machines ... | 2.85 | 2.75 | ..... | |
| Phillips' Patent with Augers .. | 7.00 | 7.50 | ..... | |
| Miller's Falls.... | 7.50 | ..... | ..... | 25% |

*Fluting.*

Knox, 4½-inch Rolls .....$2.25 each } 30%
Knox, 6-inch Rolls.....$3.60 each }
Eagle, 3¼-inch Roll. $2.15..... .....35%
Eagle, 5¼-inch Roll. $2.85..... .....30%
Crown, 4½ in., $3.50; 6 in., $4.00; 8 in., $6.50 each..... .....25%
Crown Jewel 6 in.....$3.50 each, 30%
American, 5 in., $3.00; 6 in., $3.40; 7 in., $4.50 each..... .....35%
Domestic Fluter .....each, $1.50
Geneva Hand Fluter, White Metal ₩ dos $12, 25%
Crown Hand Fluter, Nos. 1, $15.00; $12.50; 3, $10.00..... .....30%
Shepard Hand Fluter, No. 35 ₩ doz 15 90.. ..... .....40%

Shepard Hand Fluter, No. 110 ₱ doz $11.00.....40%
Shepard Hand Fluter, No. 95 ₱ doz $8.00.....40%
Clark's Hand Fluter, ₱ doz $15.00.....35%
Combined Fluter and Sad Iron, ₱ doz $15.00.....30%
Buffalo ₱ doz $10.00.....10%

*Hoisting—*
Moore's Hand Hoist, with Lock Brake.....20%
Moore's Differential Pulley Block...40%
Energy Mfg. Co's.....25%
Sure Grip Steel Tackle Blocks.....25%

*Washing—*
Anthony Wayne, ₱ doz No. 1, $51; No. 2, $45; No. 3, $42
Western Star, ₱ doz No. 2, $45; No. 3, $48.

**Mallets.**
Hickory.....20&10@20&10&10%
Lignumvitæ.....20&10@20&10&10%
B. & L. Block Co., Hickory & L. V. 30@30&10%
**Mattocks.** Regular list. 60&10@60&10&5%

**Measures—**
Standard Fiberware, No. 1, peck, ₱ dozen, $4; ½-peck, $3.50.

**Meat Cutters**—See Cutters, Meat.

**Menders, Harness—**
Per doz.....$2.00

**Mills.**
*Coffee—*
Box and Side, List Jan. 1, 1888.....60&2%
American, Enterprise Mfg Co.20&10@30%
The Swift, Lane Bros.....20&10%

**Mincing Knives** — See Knives, Mincing.

**Molasses Gates**—See Gates, Molasses.

**Money Drawers** — See Drawers, Money.

**Mowers, Lawn.**
Pennsylvania. New Model, Excelsior, Continental, &c.....60@60&5%
Philadelphia.....60@10&
Perfection.....60&10@10%
Easy.....60&10@60&10&5%
Other Machines.....60&10&5@70%

**Muzzles—**
Safety.....₱ doz, $5.00, 25%

## Nails.
Cut and Wire. See Trade Report.
Wire Nails, Papered.
Association list, July 15,'89.....75&10%
Tack Mfrs.' list.....70%
Wire Nails, Standard Penny.
Card June 1, '89, base.....$2.30 @ $2.35

*Horse—*

| | Nos. 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|
| Ausable.... | .28¢ | 26¢ | 25¢ | 24¢ | 23¢. |

40&5&5&2%

| | | | | | |
|---|---|---|---|---|---|
| Clinton, Fin.. | 19¢ | 17¢ | 16¢ | 15¢ | 14¢..... 80% |
| Essex..... | .23¢ | 26¢ | 25¢ | 24¢ | 23¢. |

40&5&5&2%

| | | | | | |
|---|---|---|---|---|---|
| Lyra | .19¢ | 17¢ | 16¢ | 15¢ | 14¢.....30% |
| Snowden | 19¢ | 17¢ | 16¢ | 15¢ | 14¢.....30% |
| Putnam..... | .23¢ | 21¢ | 20¢ | 19¢ | 18¢. |

1000 ℔ in year 15%

| | | | | | |
|---|---|---|---|---|---|
| Vulcan..... | .23¢ | 21¢ | 20¢ | 19¢ | 18¢..12½&5% |
| Northwest'n. | 25¢ | 23¢ | 22¢ | 21¢ | 20¢. |

25@25&5%

| | | | | | |
|---|---|---|---|---|---|
| Globe..... | .23¢ | 21¢ | 20¢ | 19¢ | 18¢. |

20&5&5%

| | | | | | |
|---|---|---|---|---|---|
| Boston..... | .23¢ | 21¢ | 20¢ | 19¢ | 18¢. |

20&5&5%

| | | | | | |
|---|---|---|---|---|---|
| A. C..... | .25¢ | 23¢ | 22¢ | 21¢ | 21¢. |

25&10@33½&5%

| | | | | | |
|---|---|---|---|---|---|
| C. B.-K..... | .25¢ | 23¢ | 22¢ | 21¢ | 21¢. |

25&10@33½&5%

| | | | | | |
|---|---|---|---|---|---|
| Maud S..... | .25¢ | 23¢ | 22¢ | 21¢ | 21¢. |

40&10%

| | | | | | |
|---|---|---|---|---|---|
| Champlain.. | .28¢ | 26¢ | 25¢ | 24¢ | 23¢. |

25&10&10%

| | | | | | |
|---|---|---|---|---|---|
| Saranac..... | .23¢ | 21¢ | 20¢ | 19¢ | 18¢...30&10% |
| Champion ... | .25¢ | 23¢ | 22¢ | 21¢ | 20¢. |

10&10&10%

| | | | | | |
|---|---|---|---|---|---|
| Capewell.... | .23¢ | 26¢ | 5¢ | 24¢ | 23¢. |

35&5&35&10%

| | | | | | |
|---|---|---|---|---|---|
| Star..... | .23¢ | 21¢ | 20¢ | 19¢ | 18¢. |

10&10&10&12½%

| | | | | | |
|---|---|---|---|---|---|
| Anchor..... | .23¢ | 21¢ | 20¢ | 19¢ | 18¢.....35% |
| Western..... | .23¢ | 21¢ | 20¢ | 19¢ | 18¢...40&10% |

Empire Bronzed.....14 ₱ ℔.

*Picture—*
Brass Head, Sargent's list.....50&10&10%
Brass Head, Combination list.....50&10%
Porcelain Head, Sargent's list.50&10&10%
Porcelain Head, Combination list..40&10%
Niles' Patent.....40%

**Nail Pullers.**—See Pullers, Nail.

**Nail Sets.**—See Sets, Nail.

**Nut Crackers.**—See Crackers, Nut.

**Nuts**—List Dec. 18, 1889.

| | Square. | Hex. |
|---|---|---|
| Hot Pressed..... | 5.40¢ | 6.00¢ off list. |
| Cold Punched..... | 5.00¢ | 5.10¢ off list. |

In packages of 100 ℔, add 1-10¢ ₱ ℔. net; in packages less than 100 ℔, add ½¢ ₱ ℔, net.

## Oakum—
Best or Government.....₱ ℔ 7@7½¢
U. S. Navy.....₱ ℔ 6@6½¢
Navy.....₱ ℔ 5½@6¢

**Oilers—**
Zinc and Tin.....65&10@70%
Brass and Copper.....50&10@50&10&5%
Malleable, Hammers' Improved, No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₱ doz. 10@10&5%
Malleable, Hammers, Old Pattern, same list.....40%
Prior's Pat. or "Paragon" Zinc, 60&10&10%
Prior's Pat. or "Paragon" Brass.....50%
Olmstead's Tin and Zinc.....50%
Olmstead's Brass and Copper.....50%
Broughton's Zinc.....60%
Broughton's Brass.....50%
Gem P. D. & Co.....₱ gro. $2
Steel, Draper and Williams.....50%

**Openers, Can.**
Messenger's Comet.....₱ doz $3.00, 25%
American.....₱ gross $3.00
Duplex.....doz 20¢, 15@20%
Lyman's.....₱ doz $3.75, 20%
No. 4 French.....₱ doz $2.25, 55@60%
No. 5, Iron Handle.....₱ gr $6.00, 45@50%
Eureka.....₱ doz $2.50, 10%
Sardine Scissors.....₱ doz $2.75@3.00
Star.....₱ doz $2.75
Sprague, No. 1, $2.00; 2, $2.25; 3, $2.50. 50&10&10%
Excelsior No. 1 $2.50; No. 2, $1.80.....45%
World's Best, ₱ gross, No. 1, $12.00; No. 2, $24.00; No. 3, $36.00.....50&10%
Universal, ₱ doz $3.00.....55&5%
Domestic, ₱ doz $2.50.....45%
Champion ₱ doz $2.00.....60%

## Packing, Steam—
*Rubber—*
Standard.....60&5@65%
Extra.....50@50&5%
N. Y. B. & P. Co., Standard.....50%
N. Y. B. & P. Co., Empire.....60%
N. Y. B. & P. Co., Salamander.....25%
Jenkins' Standard. ₱ ℔ 80¢...35@25&5%

*Miscellaneous—*
American Packing.....10¢@11¢ ₱ ℔
Russia Packing.....14¢ ₱ ℔
Italian Packing.....13¢@14¢ ₱ ℔
Cotton Packing.....15¢@17¢ ₱ ℔
Jute.....7¢@8¢ ₱ ℔

**Padlocks**—See Locks.

**Pails.**
*Galvanized Iron—*

| | Quarts | 10 | 12 | 14 |
|---|---|---|---|---|
| Hill's Light Weight, ₱ doz. | $2.75 | 3.00 | 3.25 | |
| Hill's Heavy Weight, ₱ ds. | 3.00 | 3.25 | 3.75 | |
| Helwig's. | 2.50 | 2.75 | 3.00 | |
| Sidney Shepard & Co. | 2.35 | 2.85 | 3.05 | |
| Iron Clad | 2.50 | 2.75 | 3.00 | |
| Fire Buckets | 2.75 | 3.25 | 3.50 | |

Buckets, see Well Buckets.
*Indurated Fibre Ware—25%*
Star Pails, 12 qt .....₱ doz $5 40
Fire, Stable and Milk, 14 qt ..₱ doz $7.80
*Standard Fibre Ware—*

| | Plain. | Deer'd |
|---|---|---|
| Water Pails, 12 qt., per doz. | $4.00 | $4.50 |
| Dairy Pails, 14 qt., per dos. | 4.50 | 5.00 |
| Fire Pails, No. 1, 12 qt. per dos | 4.50 | |
| Fire Pails, No. 2, 14 qt. per dos | 5.00 | |
| Sugar Pails | 6.00 | 6.50 |
| Horse Pails | 5.00 | |
| Buggy Pails | 4.00 | |
| Slop Jars (bal. trap) | 8.00 | 9.00 |
| Chamber Pails, 14-qt | 6.50 | 7.50 |

**Pans.**
*Dripping.*
Small sizes.....₱ ℔ 6½¢
Large sizes.....₱ ℔ 5½¢
Silver & Co. (Covered).....40%
*Fry—*
Standard List:

| No. | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| ₱ doz. | $3.00 | $3.75 | $4.25 | $4.75 | $5.25 |
| No. | 5 | 6 | 7 | 8 | |
| ₱ doz. | $6.00 | $7.00 | $8.00 | $9.00 | |

Polished, regular goods.....75@75&10%
Acme Fry Pans.....60&10%
*Dust—*
Steel Edge, No. 1.....₱ doz $1.75

**Paper and Cloth—**
*Sand and Emery—*
List April 19, 1886.....50@50&10%
Sibley's Emery and Crocus Cloth.....30%

**Parers.**
*Apple.*
Advance.....₱ doz $4.75
Baldwin.....₱ doz 5.25
Bonanza.....each 5.00
Champion.....₱ doz 7.25
Daisy.....₱ doz 4.00
Dandy.....each 7.50
Eureka, 1888.....each 16.00
Family Bay State.....₱ doz 12.00
Favorite.....₱ doz 5.00
Gem.....₱ doz 5.25
Gold Medal.....₱ doz 4.00
Ideal.....₱ doz 4.00
Improved Bay State..₱ doz 27.00 @ 30.00
Little Star.....₱ doz 4.50
Monarch.....₱ doz 13.50
New Lightning.....₱ doz 5.50
Oriole.....₱ doz 4.00
Penn.....₱ doz 4.00
Perfection.....₱ doz 4.00
Pomona.....₱ doz 4.00
Rocking Table.....₱ doz 6.00
Turntable.....₱ doz 4.50
Victor.....₱ doz 13.50
Waverly.....₱ doz 4.00
White Mountain.....₱ doz 4.00
73.....₱ doz 4.25
76.....₱ doz 5.75
78.....₱ doz. 6.50
*Potato—*
White Mountain.....₱ doz $4.50
Antrim Combination.....₱ doz $5.50
Hoosier.....₱ doz $13.50
Saratoga.....₱ doz $5.50

**Pencils—**
Faber's Carpenters'.....high list 50%
Faber's Round Gilt.....₱ gro $5.25
Dixon's Lead.....₱ gro $4.50
Dixon's Lumber.....₱ gro $6.75
Dixon's Carpenters'.....10%

**Picks—**
Railroad or Adze Eye, 5 to 6, $12.00; 6 to 7, $13.00.....60&10@60&10&5%

**Picture Nails.**—See Nails, Picture.

**Pinking Irons.**—See Irons, Pinking.

**Pins.**
*Bow—*
Humason, Beckley & Co.'s.....60&10%
Sargent & Co's....$17 and $18.....60&10%
Peck, Stow & W Co... 50&10&50&10&5%
*Curtain—*
Silvered Glass.....net
White Enamel.....net
*Escutcheon.*
Iron, list Nov. 11, 1885..50&10@50&10&5%
Brass.....60@60&5%

**Pipe, Wrought Iron—**
List September 15, 1889.
1¼ and under, Plain.....55%
1¼ and under, Galvanized.....45%
1¼ and over, Plain.....55%
1¼ and over, Galvanized.....52½%
Boiler Tubes.
Sizes up to 2¾ in. inclusive.....55%
Sizes 3 to 6 in. inclusive.....65%
Sizes 7 in. and up.....55%
Casing.....55%

**Planes and Plane Irons—**
*Wood Planes—*
Molding.....35&2%
Bench, First Quality.....50&2%
Bench, Second Quality.....55&2%
Bailey's (Stanley R. & L. Co.)..40&10%
*Iron Planes—*
Bailey's (Stanley R. & L. Co.).....40&10@40&10&10%
Miscellaneous Planes (Stanley R. & L. Co.).....20&10@20&10&10%
Victor Planes (Stanley R. & L. Co.).....20&10@20&10&10%
Steer's Iron Planes.....35@35&10%
Merrien Mal. Iron Co.'s.....40@40&10%
Davis's Iron Planes.....40@40&10%
Birmingham Plane Co.....50@50&10%
Gage Tool Co.'s Self-Setting...20&10&10%
Chaplin's Iron Planes.....40@40&10%
Sargent's.....30&10@30&10&10%
Standard Tool Co.....50@50&5%
*Plane Irons—*
Butcher's.....$5.00@$5.25 to 2
Buck Bros.....30%
Auburn "Thistle"
Ohio.....35&2%
Sandusky
S. & I. J. White.....35%

**Plates.**
Felloe.....₱ ℔ 6¢@6½¢

**Pliers and Nippers—**
Button's Patent.....50@50&10%
Hall's No. 2, 5 in., $13.50; No. 4, 7 in. $21.00 ₱ dos.....20&10@33½&5%
Humason & Beckley Mfg. Co..50@50&10%
Lindsay's Giant.....40%
Gas Pliers.....30%
Gas Pliers, Custar's Nickel Plated..60&5%
Eureka Pliers and Nippers.....40%
Russell's Parallel.....25%
P. S. & W. Cast Steel.....50%
P. S. & W. Tinners' Cutting Nippers, add 6% dis 10%
Carew's Pat. Wire Cutters.....20%
Morrill's Parallel, ₱ dos, $12.00....30&5%
Cronk's 8 in., $15.00; 10 in. $21.00, 40&10&5%

**Plumbs and Levels—**
Regular List.....70&10@70&10&10%
Disston's.....50%
Pocket Levels.....70&10@70&10&10%
Davis Iron Levels.....30%
Davis' Inclinometers.....10&10%

**Poachers.**
*Egg.*
Buffalo Steam Egg Poachers, ₱ doz, No. 1, $6.00; No. 2, $9.00.....25%
Silver & Co., 6-Ring..₱ dos $4; 3-Ring $2

**Pokes, Animal—**
Bishop's I. X. L.....₱ doz $6.00
Bishop's O. K.....₱ doz $5.25
Bishop's Pioneer.....₱ doz $3.75
Bishop's American.....₱ doz $2.75
Eagle, Double Stale.....₱ doz $5.75
Eagle, Single Stale.....₱ doz $3.75
Buckeye, Single Stale.....₱ doz $2.75

**Police Goods.**
R. I. Tool Co., Handcuffs, $15.00 ₱ dos 10%
R. I. Tool Co., Leg Irons, $25.00 ₱ dos 10%
Tower's.....25%
Daley's Improved Handcuffs: 2 Hands, Polished, ₱ dos $48.00; Nickeled, $57.00: 3 Hands, Polished, ₱ dos $72.00; Nickeled, $84.00.....25%
J. P. Lovell's Police Goods.....25%

**Polish, Metal.**
Prestoline.....30%
Prestoline Paste.....33½%
Gaston's Silver Compound.....33½%

**Polish, Stove.**
Joseph Dixon's.....₱ gro $6.00, 10%
Gem.....₱ gro $4.50, 10%
Gold Medal.....₱ gro $6.00, 25%
Mirror.....₱ pro $6.00, —%
Lustro.....₱ gro $4.75
Ruby.....₱ gro $3.75
Rising Sun, 5 gro lots.....₱ gro $5.50
Dixon's Plumbago.....₱ ℔ 8¢
Boynton's Noon Day, ₱ gro.....13.00
Parlor Pride Stove Enamel..₱ gro
Yates' Liquid, 2 3 5 10 gal....
₱ gal ...$0.80 .70 .60 .50
Yates Standard Paste Polish, 10-℔ cans, ₱ ℔ 12½¢
Jet Black.....₱ gro $3.50
Japanese.....₱ gro $3.50
Fireside.....₱ gro $2.50
Diamond O. K. Enamel.....₱ gro $19.00
Bonnell's Liquid Stove Polish..₱ gro $9.00
Bonnell's Paste Stove Polish..₱ gro $6.00
Black Eagle Bensine Paste, 5 and 10 ℔ cans.....12½¢
Black Jack Water Paste, 5 and 10 ℔ cans.....12½¢
Nickel Plate Paste.....₱ gro $6.00
Crown Paste.....₱ gross, $7.20
Crown Paste, in 5 and 10 ℔ pails ₱ ℔ 12¢
Black Flag.....₱ gross, $7.20
Black Flag, 5 and 10 ℔ pails.....₱ ℔, 12¢
Black Flag, liquid, in bottles, ₱ gro..$8.00

**Poppers, Corn—**
Round or Square, 1 qt..₱ gr $10.00@10.50
Round or Square, 1½ qt..₱ gr $15@15.50
Round or Square, 2 qt..₱ gr $18.50@19.00

**Post Hole and Tree Augers and Diggers**—See Diggers, Post Hole, &c.

**Potato Parers**—See Parers, Potato.

**Pots.**
*Glue—*
Tinned.....40%
Enameled.....40&5%
Family, Howe's "Eureka".....40%
Family, L. F. C.'s "Handy".....50%

**Presses.**
*Fruit and Jelly—*
Enterprise Mfg. Co.....20&10@30%
Henis.....₱ doz $3.50
Shepard's Queen City.....40%
Silver & Co.....₱ doz $2.75

**Pruning Hooks and Shears,**—See Shears.

**Pullers.**
*Nail.*
Scranton.....₱ doz $18.00, 33⅓%
Curtiss Hammer.....₱ doz $9.00
Giant, No. 1.....₱ dos. $13.00, 10%
Giant, No. 2.....₱ dos, $15.00, 10%
Pelican.....₱ dos. $9.00, 25%
Eclipse.....₱ doz, $18.00, 30%

**Pulleys—**
Hot House, Awning, &c.....60&10%
Japanned Screw.....60&10%
Brass Screw.....60&10%
Japanned Side.....66⅔&10%
Japanned Clothes Line.....60&10%
Empire Sash Pulley.....55@60%
Moore's Sash, Anti-Friction.....50%
Hay Fork, Solid Eye, $4.00; Swivel, $4.50.....50&10@50&10&5%
Hay Fork, "Anti-Friction," 5 in. Solid, $5.70.....50%
Hay Fork, "F" Common and Pat. Bushed.....50%
Hay Fork, Tarbox Pat. Iron.....20%
Hay Fork, Reed's Self-Lubricating...60%
Shade Rack.....45%
Tackle Blocks.....See Blocks
Moore's Anti-Friction 5 in. Wheel, ₱ doz $13.00.....40%

**Pumps—**
Cistern, Best Makers.....60@60&10%
Pitcher Spout, Best Makers.....67½@70%
Pitcher Spout, Cheaper Goods.70@70&5%

**Punches—**
Saddlers' or Drive, good, ₱ dos...60@65%
Bemis & Call Co.'s Cast Steel Drive..50&5%
Bemis & Call Co's Springfield Socket.50&5%
Spring, good quality....₱ dos $2.50@3.00
Spring, Leach's Pat.....15%
Bemis & Call Co.'s Spring and Check..40%
Solid Tinners', P.S. & W. Co., ₱ doz $1.44, 55%
Tin'rs' Ho.'ow Punches P.S. & W. Co. 20&2%
Rice Hand punches.....15%
Avery's Revolving.....40%
Avery's Saw-Set and Punch. See Saw Sets.

## Rail—
Sliding Door. Wr't Brass, ₱ ℔ 35¢.....15%
Sliding Door, Bronzed Wr't Iron..₱ ft. 7¢
Sliding Door, Iron, Painted, ₱ foot 4¢, 40%
Barn Door. Light. In. ½ ⅝ ¾
Per 100 feet.....$2.00 2.50 3.10, 10%
B. D. for N. E. Hangers—
Small. Med. Large.
Per 100 feet...$2.15 2.70 3.25..net
Terry's Steel Rail, ₱ foot.....4½¢
Victor Track Rail, 7¢ ₱ foot.....50&2%
Carrier Steel Rail, ₱ foot.....4½¢
Moore's Wrought Iron.....35%

**Rakes—**
Cast Steel, Association goods...65%@70%
Cast Steel, outside goods 60&10&10@70&5%
Malleable.....70@70&5%
Gibbs Lawn Rake.....$12.00, 50&15
Canton Lawn Rake.....$9.00, 50&10
Ft. Madison Prize Bow Brace and Pearless.....60%
Fort Madison Steel Tooth Lawn Rake, $6.00.....35%

**Razors—**
J. R. Torrey Razor Co.....30%
Wostenholme and Butcher, $10.00 to £.
10%
Jordan's AAAI, new list.....net
Jordan's Old Faithful, new list.....net
Galvanic.....₱ doz $15.00

**Razor Strops**—See Strops, Razor.

**Rings and Ringers.**
*Bull Rings—*
Union Nut Co.....55%
Sargent's.....65%&10@70&5%
Hotchkiss' low list.....30%
Humason, Beckley & Co.'s.....70&10%
Peck, Stow & W. Co's..50&10&50&10&10%
Ellrich Hdw. Co., White Metal, low list. 50&50&10%
*Hog—*
Top of the Hill Ringers.....₱ doz $2.00
Top of the Hill Rings.....₱ doz $1.28
Hill's Improved Ringers.....₱ doz $1.35
Hill's Old Style Ringers.....₱ doz $1.12½
Hill's Tonga.....₱ doz $3.00
Hill's Rings.....₱ dos bxs $1.00
Perfect Rings.....₱ dos bxs $1.50
Perfect Ringers.....₱ doz $2.15@$2.25
Blair's Hog Ringers.....₱ doz $2.00
Blair's Hog Rings.....₱ dos 99¢@$1.00
Champion Ringers.....₱ doz $2.00
Champion Rings, Double.....₱ doz $2.25
Brown's Ringers.....₱ doz $2.00
Brown's Rings.....₱ dos $1.15@1.25
Electric Hog Rings...₱ doz boxes $1.50
Electric Hog Rings.....₱ doz $2.00

**Rivets and Burrs—**
Iron, list Nov. 17, '87.....40%
Copper.....60@60&10%
Coppered Iron, Bertina Brand.....40%

**Rivet Sets**—See Sets.

**Rods—**
Stair, Brass.....25&2%
Stair, Black Walnut.....₱ doz 40¢

**Rollers—**
Barn Door, Sargent's list.....60&10&10%
Acme Moore's Anti-Friction.....55%
Union Barn Door Roller.....70%

**Rope.**
Manila...¾ in. and larger.....₱ ℔ 10½¢
Manila.....¾ in. ₱ ℔ 10¾¢
Manila.....¾ and 5-16 in. ₱ ℔ 11¼¢
Manila Tarred Rope.....₱ ℔ 8¾¢
Manila, Hay Rope.....₱ ℔ 10¾¢
Sisal.....¾ inch and larger ₱ ℔ 7¼¢
Sisal.....⅝ in. ₱ ℔ 7¾¢
Sisal.....¾ and 5-16 in. ₱ ℔ 8¼¢
Sisal, Hay Rope.....₱ ℔ 7¼¢
Sisal, Tarred Rope.....₱ ℔ 6¾¢
Sisal, Medium Lathe Yarn.....₱ ℔ 6 ¢
New Zealand..¾ in. and larger ₱ ℔ 7 ¢
New Zealand.....⅝ inch, ₱ ℔ 7½¢
New Zealand..¼ and 5-16 inch, ₱ ℔ 8 ¢
New Zealand, Hay Rope.....₱ ℔ 7 ¢
New Zealand, Tarred Rope.....₱ ℔ 6½¢
*Note.*—Manufacturers' prices on above ¼¢ ₱ ℔ less, f.o.b. factory.
Cotton Rope.....₱ ℔ 13½@16¢
Jute Rope.....₱ ℔ 6½@6¾¢
*Wire—*
List May 1, 1886.
Iron.....32½&2½%
Iron, Galvanized.....40&2½%
Cast Steel.....40&2½%

**Rules—**
Boxwood.....80&10&10@80&10&10&10%
Ivory.....50&50&10%
Starrett's Rules and Straight Edges, Steel.....35&10%

## Sad Irons—See Irons, Sad.
**Sand and Emery Paper and Cloth**—See Paper and Cloth, Sand and Emery.
**Sash Cord**—See Cord, Sash.
**Sash Locks**—See Locks, Sash.
**Sash Weights**—See Weights, Sash.
**Sausage Stuffers or Fillers**—See Stuffers or Fillers, Sausage.

**Saws—**
Disston's Circular.....45%
Disston's Cross Cuts.....45%
Disston's Hand.....30%
Woodrough & McFarlin.
Hand, Panel and Rip.....25%
Narrow Champion Cross Cuts with Handles, ₱ foot.....20¢
Champion Thin Back Cross Cuts, ₱ foot.....28¢
Champion Extra Thin Back Cross Cuts, ₱ foot.....31¢
One Man Champion Cross Cuts, ₱ foot.....40¢
Wheeler, Madden & Clemson Mfg. Co.
Hand, Panel and Rip.....30%
Narrow Champion Cross Cuts with Handles, ₱ foot.....20¢
Champion Thin Back Cross Cuts, ₱ foot.....23¢
Champion Extra Thin Back Cross Cuts, ₱ foot.....31¢
One Man Champion Cross Cuts, ₱ ft. 40¢

Atkins' Circular Shingle and Heading dis 50%
Atkins' Silver Steel Diamond X Cuts ₱ foot 70¢
Atkins' Special Steel Dexter X Cuts ₱ foot 50¢
Atkins' Special Steel Diamond X Cuts ₱ foot 32¢
Atkins' Champion and Electric Tooth X Cuts ₱ foot 20¢
Atkins' Hollow Back X Cuts. ₱ foot 20¢
Atkins' Mulay, Mill and Drag 40%
Atkins' One-Man Saw, with handles, ₱ foot 40¢
Peace Circular and Mill 45%
Peace Hand Panel and Rip 25%
Peace Cross Cuts 45%
Richardson's Circular and Mill 45%
Richardson's X Cuts 45%
Richardson's Hand, &c. 25%
C. E. Jennings & Co., Hand, Panel and Rip 25%

*Hack Saws—*

Griffin's, complete 40&10@50%
Griffin's Hack Saw, Blades 40&10@50%
Star Hack Saws and Blades 25%
Eureka and Crescent 25%

*Scroll—*

Lester, complete, $10.00 25%
Rogers, complete, $4.00 25%
Barnes' Builders' and Cabinet Makers', $15 25%
Barnes' Scroll Saw Blades 35%

**Saw Frames**—See Frames, Saw.

**Saw Sets**—See Sets, Saw.

**Saw Tools**—See Tools, Saw.

**Scales—**

Hatch, Counter, No. 171, good quality, ₱ doz $21.00
Hatch, Tea, No. 161 ₱ doz $6.75@$7.00
Union Platform, Plain $2.10@2.20
Union Platform, Striped $2.40@2.50
Chatillon's Grocers' Trip Scales 50%
Chatillon's Eureka 25%
Chatillon's Favorite 40%
Family, Turnbulls 50@30&10%
Riehle Bros.' Platform 40%

**Scale Beams**—See Beams, Scale.

**Scissors, Fluting** 45%

**Scrapers—**

Adjustable Box Scraper (S. R. & L. Co.) $6.50 30&10%
Box, 1 Handle ₱ doz $4.00. 10%
Box, 2 Handle ₱ doz $6.00, 10%
Defiance Box and Ship 20&10%
Foot 50&10@60%
Ship, Common ₱ doz $3.50 net
Ship, R. I. Tool Co. 10%

**Screen Window and Door Frames**—See Frames.

**Screw Drivers**—See Drivers, Screw.

**Screws.**

*Bench and Hand—*

Bench, Iron 55&10@55&10&10%
Bench, Wood, Beech ₱ doz $2.25
Bench, Wood, Hickory 20&10%
Hand, Wood 25&10@25&10&5%
Lag, Blunt Point, list Jan. 1, 1890 75&10%
Coach and Lag, Gimlet Point, list Jan. 1, 1890 75@75&10%
Bed 25&5%
Hand Rail, Sargent's 60&10%
Hand Rail, H. & T. Mfg. Co. 70&10@75%
Hand Rail, Am. Screw Co. 75%
Jack Screws, Millers Falls list 50@50&5%
Jack Screws, P. S. & W. 35%
Jack Screws, Sargent 60&10@60&10&5%
Jack Screws Stearns' 40@40&10%

*Cork—*

Humason & Beckley Mfg. Co. 40&10@50%
Williamson's 33⅓@33⅓&2½%
Howe Bros & Hulbert 35%

*Machine—*

Flat Head, Iron 55%
Round Head, Iron 50%

*Wood—*

List January 1, 1891.

Flat Head Iron 72½% } Extra 10 of 1025 % on gross.
Round Head Iron 67½%
Flat Head Brass 72½%
Round Head Brass 65 %
Flat Head Bronze 72½%
Round Head Bronze 65 %
Rogers' Drive Screws 33⅓%

**Scroll Saws**—See Saws, Scroll.

**Scythes.**

Grain 40&5@40&10%
Grass 40&10@50%

**Scythe Snaths**—See Snaths, Scythe

**Sets.**

*Awl and Tool.*

Aiken's Sets, Awls and Tools, No. 20, ₱ doz $10.00 55&10%
Fray's Adj. Tool Hdls., Nos. 1, $12; 2, $18; 3, $13; 4, $9. 35@35&10%
Miller's Falls Adj. Tool Hdls., Nos. 1, $12, 2, $18 25%
Henry's Combination Hafts ₱ doz $6.50
Brad Sets, No. 42, $10.50; No. 43, $12.50 70&10@5%
Stanley's Excelsior: No. 1, $7.50; No. 2, $4.00; No. 3, $3.50 30&10%

*Nail—*

Square ₱ gr., $4.00@$4.25
Round ₱ gr. $3.25
Buck Bros. 27½%
Cannon's Diamond Point ₱ gr., $12, 20%

*Rivet,*

Regular list 50&10%

*Saw—*

Stillman's Genuine ₱ doz $5.00@7.75, 40&5%
Stillman's Imita ₱ doz $3.25@5.25, 40&5@40&10%
Common Lever ₱ doz $3.00, 40&5%
Morrill's No. 1, $15.00; Nos. 2&4, $24.00, 40&10@50%
Leach's. No. 0, $8.00; No. 1, $15, 15@20% cash 20&10@20&10&10

Hammer, Hotchkiss $5.50, 10%
Hammer, Bemis & Call Co.'s new Fat. 30&5%
Bemis & Call Co.'s Lever and Spring Hammer 30&5%
Bemis & Call Co.'s Plate 10%
Bemis & Call Co.'s Cross Cut 12½%
Aiken's Genuine $13.00, 50&10%
Aiken's Imitation $7.00, 55&5%
Hart's Pat. Lever 20%
Disston's Star 25%
Leopold 40&10@50%
Atkin's Lever ₱ doz No. 1, $6.00
Atkin's Criterion ₱ doz No. 1, $6.00
Croissant (Keller), No. 1, $15.00; No. 2, $24.00 40&10%
Avery's Saw Set and Punch 50%
Chieftain H. R. Co.'s Superior ₱ doz $15, 50%

**Sharpeners, Knife.**

Parkins.
Applewood Handles ₱ doz $6.00, 40%
Rosewood or Cocobolo. ₱ doz $9.00, 40%

**Shaves, Spoke.**

Iron 45%
Wood 30%
Bailey's (Stanley R. & L. Co.) 40&10%
Stearns' 30&10%
Cincinnati 35&10%
Goodell's, ₱ doz $9.00 25%

**Shears—**

American (Cast) Iron 75&10@75&10&5%
Barnard's Lamp Trimmers ₱ doz $3.75
Tinners' 20&2%
Seymour's, List, Dec., 1881. 60&10&10@60&10&10&5%
Heinisch's, List, Dec., 1881. 60&10&10@60&10&10&5%
Heinisch's Tailor's Shears 33⅓&5
First quality C. S. Trimmers 80@80&10%
Second quality C. S. Trimmers 80&10@80&10&10%
Acme Cast Shears 10&10%
Diamond Cast Shears 10%
Clipper 10&10%
Victor Cast Shears 75&10@75&10&5%
Howe Bros. & Hulbert, Solid Forged Steel 40%
Chicago Drop Forge & F. Co., Solid Steel Forged 60%
Clauss Shear Co., Japanned 70%
Clauss Shear Co., Nickeled, same list 60%
Galvanic, 3¼ to 9 in, ₱ doz, $1.00 ₱ inch

*Pruning Shears and Hooks.*

Disston's Combined Pruning Hook and Saw ₱ doz $18.00, 20&10%
Disston's Pruning Hook, ₱ doz $12.00, 20&10%
E. S. Lee & Co.'s Pruning Tools 40%
Pruning Shears, Henry's Pat, ₱ doz $3.75@4.00
Henry's Pruning Shears, ₱ doz $4.25@4.50
Wheeler, M. & C. Co.'s Combination, ₱ doz $12.00, 20%
Dunlap's Saw and Chisel, ₱ doz $8.50, 30%
J. Mallinson & Co., No. 1, $5.25; No. 2 7.25
P., S. & W. Co. 60%

*Tinners', &c.—*

Shears and Snips (P. S. & W.) 20@25%
Snips, J. Mallinson & Co. 33⅓%

**Sheaves—**

*Sliding Door—*

M. W. Co., list July, 1888 50&10@60&5%
R. & E., list Dec. 18, 1885 55&20%
Corbin's list 60&10&2%
Patent Roller 60&10&2%
Patent Roller, Hatfield's 75%
Russell's Anti-Friction, list Dec. 18, 1885 60&2%
Moore's Anti-Friction 50%

*Sliding Shutter—*

R. & E. list Dec. 18, 1885 60&10&2%
Sargent's list 60&10%
Reading list 60&10&10%

**Ship Tools—**

L. & I. J. White 20&5%

**Shoes, Horse, Mule, &c.—**

*Horse—*

Burden's, Perkins', Phœnix and Bryden's Boss at factory. 45.00
Bryden's Frog Pressure, at factory. 85.00

*Mule—*

Add $1 ₱ keg to above prices.

*Ox, Wrought—*

Ton lots ₱ ℔ 0¢
1000 ℔ lots ₱ ℔ 0½¢
500 ℔ lots ₱ ℔ 10¢

**Shot—**

| | Ton lots | Small lots |
|---|---|---|
| Drop, up to BB, 25-℔ bag | $1.37 | $1.42 |
| Drop, up to BB, 5-℔ bag | .35 | .36 |
| Drop, BB and larger, 25-℔ bag | 1.62 | 1.67 |
| Drop, BB and larger 5-℔ bag | .40 | .41 |
| Buck and Chilled, 25-℔ bag | 1.62 | 1.67 |
| Buck and Chilled, 5-℔ bag | .40 | .51 |
| Dust Shot, 25-℔ bag | 2.00 | 2.05 |
| Dust Shot, 5-℔ bag | .45 | .46 |

**Shovels and Spades—**

Ames' Shovels, Spades, &c., list Nov. 1, 1885 20%
NOTE.—Jobbers frequently give 5@7½% extra on above.
Griffith's Black Iron 50&10%
Griffith's C. S. 60@60&10%
Griffith's Solid C. S. R. R. Goods 20%
St. Louis Shovel Co. 20@20&7½%
Hussey, Binns & Co. 15@25%
Hubbard & Co. 20@20&7½%
Lehigh Mfg. Co. 50&10%
H. M. Myers Co. 30%
Payne Pettebone & Son 33⅓&5%
Remington's (Lowman's Pat.) 30&10@40%
Rowland's, Black Iron 50&10%
Rowland's Steel 60&5@60&10%

**Shovels and Tongs—**

Iron Head 60&10@60&10&5%
Brass Head 60&10&10%

**Sieves—**

Mann's Tin Rim 50&25%
Buffalo Metallic, S. S. & Co. 50&25%
Shaker (Barler's Pat.) Flour Sifters ₱ doz $2.00; ₱ gr $21.60
Electric ₱ gr $21.00
A. & W. Sifters ₱ doz 2.00
Hunter's ₱ doz $2.00
Smith's Adjustable Sifters ₱ doz $2.00
Smith's Adjustable Milk Strainer. ₱ doz $2.00
Smith's Adjustable T. & C. Strainer. ₱ doz. $1.25

*Sieves, Wooden Rim—*

| | Iron. | Plated. |
|---|---|---|
| Mesh 18, Nested, ₱ doz | 80¢ | $1.00 |
| Mesh 20, Nested, ₱ doz | 95¢ | 1.10 |
| Mesh 24, Nested, ₱ doz | $1.15 | 1.25 |

**Skeins, Thimble—**

Western list 75&5@75&10%
Columbus Wrt. Steel. Special net prices
Coldbrookdale Iron Co. 60%
Seneca Falls Pattern 60%
Utica P. S. T. Skeins 60%
Utica Turned and Fitted 35%

**Slates—**

School, by case 50&10@50&10&10%

**Snaps, Harness, &c.—**

Anchor (T. & S. Mfg. Co.) 65%
Fitch's (Bristol) 50&10%
Hotchkiss 10%
Andrews 50%
Sargent's Patent Guarded 70&10&10%
German, new list 40&10%
Covert 50&2%
Covert, New Patent 50&5&2%
Covert, New R. E. 60&3%
Covered Spring 60&10&10%

**Snaths, Scythe.**

List 60@..%

**Soldering Irons**—See Irons, Soldering.

**Spittoons, Cuspidors, &c.**

*Standard Fiberware—*

Cuspidors, 8½-inch, ₱ doz., No. 5, $8; No. 5X $9.
Spittoons, Daisy, 8-inch, No. 1, $4; 10 and 11 inch, $6.

**Spoke Shaves**—See Shaves, Spoke.

**Spoke Trimmers**—See Trimmers, Spoke.

**Spoons and Forks—**

*Tinned Iron—*

Basting, Cen. Stamp. Co.'s list 70&10%
Solid Table and Tea, Cen. Stamp. Co.'s list 70&10%
Buffalo S. S. & Co. 33⅓&2%

*Silver-Plated*—(4 mos. or 5% cash 30 days).

Meriden Brit. Co., Rogers 40&15%
C. Rogers & Bros. 40&15%
Rogers & Bro. 40&15%
Reed & Barton 40@40&5%
Wm. Rogers Mfg. Co. 40, 15&5%
Simpson, Hall, Miller & Co. 40, 15&5%
Holmes & Edwards Silver Co. 40, 15&5%
L. Boardman & Son 50&12½%

*Miscellaneous.*

Holmes & Edwards Silver Co.:
No. 67 Mexican Silver 50&10&5%
No. 30 Silver Metal 50&10&5%
No. 24 German Silver 50&10&5%
No. 50 Nickel Silver 50&5%
No. 49 Nickel Silver 50&10&5%
Wm. Rogers Mfg. Co.
Rogers' Silver Metal 50, 10&6%
18% Rogers' German Silver 60&6%
22% Rogers' Nickel Silver. 50&6%
German Silver 50@50&5
German Silver, Hall & Elton 50&5% cash
Nickel Silver 50&5@50&10&5% cash
Britannia 60@60&5%
Boardman's N'ck'l Silver 50&10&5%
Boardman's Britannia Spoons, case lots 60&5% cash

**Springs—**

*Door.—*

Torrey's Rod, regular size ₱ doz $1.30
Gray's, ₱ gr., $20.00 20%
Bee Rod ₱ gr., $20.00 20%
Warner's No. 1, ₱ doz, $2.50; No. 2, $3.30 40&10@50%
Gem (Coil), list April 19, 1886 10%
Star (Coil), list April 19, 1886 20%
Victor (Coil) 60@60&10%
Champion (Coil) 60&10@60&10&10%
Philadelphia, 5 in., $5.00; 8 in., $7.75.. %
Cowell's No. 1, ₱ doz, $18.00; No. 2, $15.00 50%
Rubbor, complete, ₱ doz, $4.50 55&10%
Hercules 50%
Shaw Door Check and Spring 25@30@35%

*Carriage, Wagon, &c.—*

Elliptic, Concord, Platform and Rail Scroll 60&10&10%
Cliff's Bolster Springs 25%

**Squares—**

Steel and Iron } .80&10@80&10&10%
Nickel-Plated } .80&10@80&10&10%
Try Square and T Bevels. 60&10@60&10&10%
Disston's Try Square and T Bevels. 50%
Winterbottom's Try and Miter. 30&10%
Starrett's Micrometer Caliper Squares. 25%
Avery's Flush Bevel Squares 40%
Avery's Bevel Protractor 50%

**Squeezers.**

*Fodder.—*

Blair's ₱ doz $2.00
Blair's "Climax" ₱ doz $1.25

*Lemon—*

Porcelain Lined, No. 1 ₱ doz $6.00, 25&20%
Wood, No. 2 ₱ doz $3.00, 35%
Wood, Common ₱ doz $1.70@1.75
Dunlap's Improved ₱ doz $3.75, 20%
Sammis. No. 1, $5.00; No. 2, $9; 12, $18 ₱ doz 25&10%
Jennings' Star ₱ doz $2.50
The Boss ₱ doz $2.50
Dean's. Nos. 1, ₱ doz $5.50; 2, $3.35; 3, $1.90; Queen, $2.50
Little Giant 50@50&5%
King 40&5%
Hotchkiss Straight Flash ₱ doz $12.00
Silver & Co., Glass ₱ gro. $9.00

**Standard Fiber Ware**—See Ware, Standard Fiber.

**Staples.**

*Blind—*

Barbed, ½ in. and larger ₱ ℔ 7@7½¢
Barbed, ⅝ in. ₱ ℔ 8@8½¢

Fence Staples, Galvanized. } Same price as B'rd Wire.
Fence Staples, Plain. } See Trd. Rep.

**Steelyards** 40&10@50%

**Stocks and Dies—**

Blacksmith's
Waterford Goods 40&10@50%
Butterfield's Goods 40&10@50%
Lightning Screw Plate 25@30%
Reece's New Screw Plates 35%&25@40%
Reversible Ratchet 30 %
Gardner 25%

**Stops, Bench.**

Morrill's ₱ doz $9, 50%
Hotchkiss's ₱ doz $5. 10@10&10%
Weston's, No. 1, $10; No. 2, $9. 25&10@5%
McGill's ₱ doz $3. 10%
Cincinnati 25&10%

**Stone—**

Hindostan No. 1, 3¢; Axe, 3½¢; Slips No. 1, 4½¢
Sand Stone ₱ ℔ 2½¢
Washita Stone, Extra ₱ ℔ 20@22½¢
Washita Stone, No. 1 ₱ ℔ 15@16¢
Washita Stone, No. 2 ₱ ℔ 11@12¢
Washita Slips, No. 1, Extra ₱ ℔ 37@40¢
Washita Slips, No. 1 ₱ ℔ 25@26¢
Arkansas Stone, No. 1, 4 to 6 in ₱ ℔ $1.50
Arkansas Stone, No. 1, 6 to 9 in ₱ ℔ $1.85
Turkey Oil Stone, 4 to 8 in ₱ ℔ 40¢
Turkey Slips ₱ ℔ $1.00@1.50
Lake Superior, Chase ₱ ℔ 15¢
Lake Superior Slips, Chase ₱ ℔ 20¢
Seneca Stone, Red Paper Brand ₱ ℔ 18@20¢
Seneca Stone, High Rounds ₱ ℔ 20@25¢
Seneca Stone, Small Whets ₱ gro $24.00

**Stove Polish**—See Polish, Stove.

**Stretchers, Carpet.**

Cast Steel, Polished ₱ doz $2.25
Cast Iron, Steel Points ₱ doz 80¢
Socket ₱ doz $1.75
Jullard's 25@25&10%

**Strops, Razor—**

Genuine Emerson 60@60&5%
Imitation " ₱ doz $2.00, 20&10&5%
Torrey's 20%
Badger's Belt and Com ₱ doz $2.00
Lamont Combination ₱ doz $4.00
Jordan's Pat. Padded, list Nov. 1, '89 50%
Electric List net

**Stuffers or Fillers, Sausage—**

Miles' "Challenge," ₱ doz $20, 50@50&5%
Perry ₱ doz, No. 1, $15.00; No. 0, $21.00 50&5@50&10%
Draw Cut No. 4, each $30.00 20%
Enterprise Mfg. Co. 20&10@30%
Silver's 40&10%

**Sweepers, Carpet.**

Bissell No. 5 ₱ doz $17.00
Bissell No. 7 New Drop Pan. ₱ doz $19.00
Bissell, Grand ₱ doz $36.00
Grand Rapids ₱ doz $24.00
Crown Jewel, No. 1, $18.00; No. 2, $19.00; No. 3, $20.00
Magic ₱ doz $15.00
Jewel ₱ doz $17.00
Improved Parlor Queen, Nickeled ₱ doz $27.00
Japanned ₱ doz $24.00
Excelsior ₱ doz $22.00
Garland ₱ doz $18.00
Parlor Queen ₱ doz $24.00
Housewife's Delight ₱ doz $15.00
Queen ₱ doz $16.00
Queen, with band ₱ doz $18.00
King ₱ doz $30.00
Weed, Improved ₱ doz $18.00
Hub ₱ doz $16.00
Cog-Wheel ₱ doz $16.00
Easy ₱ doz $22.00
Monarch ₱ doz $22.00
Goshen ₱ doz $21.00
Ladies' Friend ₱ doz $15.00
Advance ₱ doz $18.00
Supreme ₱ doz $22.00

## Tacks, Brads, &c.—

List Oct. 19, 1889. Standard Weights.

Carpet Tacks—
American Iron, Blued 80%
Am. Iron, Tin'd or Cop'd 80&10%
Steel, Plain or Bright 75&10%
Steel, Tinned or Coppered 80%
Swedes Iron, Blued 75&10%
Swedes Iron, Tinned or Cop'd 80%
American Iron Cut Tacks 80%
Swedes Ir. Uphol'rs' T'ks, Blu. 75&10%
Swedes Iron Upholsterers', Tacks, Tinned 80%
Gimp and Lace Tacks, Blued 75&10%
Gimp and Lace Tacks, Tin'd 75&10%
Swedes Iron Basket or Trimmers' Tacks 75&10%
Miners' Tacks 80%
Bill-Posters' or RR. Tacks 75&10%
Bill-Posters' or Railroad Tacks, Tinned 80%
Copper Tacks 40%
Copper Finish. & Trunk Nails 40%
Cigar Box Nails 50%
Zinc Glaziers' Points 40%
Picture-Frame Points 50%
Looking-Glass Tacks 50%
Brush Tacks 55%
Tin-Capped Trunk Nails 55%
Finishing Nails 70&10%
Trunk and Clout Nails, Black and Tinned 75%
Common and Patent Brads 75%
Hungarian Nails 75%
Basket and Chair Nails 70&10%
Leathered Carpet Tacks 55%

*Miscellaneous—*

Double-Pointed, 120 count 85&10%
Wire Carpet Nails 50&10%
Plymouth Rock Steel Carpet Tacks 25%

Extra 5 @ 10%

Wire Brads & Nails, see Nails, Wire.
Steel-Wire Brads, R. & E. Mfg. Co.'s list.....60&10%

**Tapes, Measuring—**

American.....40@40&5%
Spring.....40%
Chesterman's, Regular list.....25@30%

**Thermometers—**

Tin Case.....80@80&10%

**Thimble Skeins—See Skeins.**

**Ties, Bale—Steel**

Standard Wire, list.....50&10&5%

**Tinners' Shears, &c.—See Shears, Tinners', &c.**

**Tinware—**

Stamped, Japanned and Pieced, list Jan. 20 1887.....70&10@70&10&5%

**Tire Benders, Upsetters, &c—See Benders and Upsetters, Tire.**

**Tools.**

*Coopers'—*

Bradley's.....20%
Barton's.....20@20&5%
L. & I. J. White.....20&5%
Albertson Mfg. Co.....35%
Beatty's.....30%
Sandusky Tool Co.....30@30&5%
Shaves, Cincinnati Tool Co.....30%

*Lumber.*

Ring Peavies, "Blue Line"...₩ doz $20.00
Ring Peavies, Common.....₩ doz $18.00
Steel Socket Peavies.....₩ doz $21.00
Mall. Iron Socket Peavies.....₩ doz $19.00
Cant Hooks, "Blue Line"..₩ doz $16.00
Cant Hooks, Common Finish..₩ doz $14.00
Cant Hooks, Mall. Socket Clasp, "Blue Line" Finish.....$16.00
Cant Hooks, Mall. Socket Clasp, Common Finish.....₩ doz $14.50
Cant Hooks, Clip Clasp, "Blue Line" Finish.....₩ doz $14.00
Cant Hooks, Clip Clasp, Common Finish.....₩ doz $12.00
Hand Spikes....₩ dos 6 ft., $15.00; 8 ft., $20.00
Pike Poles, Pike & Hook, ₩ dos., 12 ft., $11.50; 14 ft., $12.50; 16 ft., $14.50; 18 ft., $17.50; 20 ft., $21.50.
Pike Poles, Pike only, ₩ dos, 12 ft., $10.00; 14 ft., $11.00; 16 ft., $13.00; 18 ft., $16.00; 20 ft., $20.00.
Pike Poles, not ironed, ₩ dos, 12 ft. $6.00; 14 ft., $7.00; 16 ft., $9.00; 18 ft., $12.00; 20 ft., $16.00.
Setting Poles ₩ dos, 12 ft., $14.00; 14 ft., $15.00; 16 ft., $17.00
Swamp Hooks.....₩ doz $18.00

*Saw.*

Atkins' Perfection.....₩ doz $12.00
Atkins' Excelsior.....₩ doz $6.00
Atkins' Giant.....₩ doz $4.00

**Tobacco Cutters—See Cutters, Tobacco.**

**Transom Lifters — See Lifters, Transom.**

**Traps—**

*Game—*

Newhouse.....40@40&5%
Oneida Pattern.....70&10%
Game, Blake's Patent.....40&10&5%

*Mouse and Rat—*

Mouse Wood, Choker, ₩ dos holes, 11@15₩
Mouse, Round Wire.....₩ dos $1.50, 10%
Mouse, Cage, Wire.....₩ dos $2.50, 10%
Mouse, Catch-'em-alive...₩ dz $2.50 15%
Mouse, Bonanza.....₩ dos ₩) 90@$1.00
Rat, Decoy.....₩ gr $10.00, 10%
Ideal.....₩ gr $10.00
Cyclone.....₩ gr $5.25
Hotchkiss Metallic Mouse, 5-hole traps, ₩ dos., 90¢; in full cases, ₩ dos.....75¢
Hotchkiss Imp. Rat Killer..₩ gro $18.50
Hotchkiss New Rat Killer...₩ gro $16.50
Schuyler's Rat Killer.....₩ gro $15.00

**Triers—**

Butter and cheese.....25%

**Trimmers, Spoke.**

Bonney's.....₩ dos $10.00, 50%
Stearns'.....20&10%
Ives', No. 1, $15.00; No. 2, $12.00 ₩ dos. 55&10%
Douglas'.....₩ dos $9.00, 20%
Cincinnati.....25%

**Trowels—**

Lothrop's Brick and Plastering, 20&10&5 ₩ 15%
Reed's Brick and Plastering.....15%
Disston's Br'k and Plastering.....25%
Peace's Plastering.....25%
Clement & Maynard's.....20%
Rose's Brick.....15@20%
Brade's Brick.....25%
Worrall's Brick and Plastering.....20%
Garden.....70%

**Trucks, Warehouse, &c.—**

B. & L. Block Co.'s list, '82.....40%

**Tubes, Boiler—**

See Pipe.

**Twine—**

| Flax Twine— | BC. | B. |
|---|---|---|
| No. 9, ¼ and ⅛ ℔ Balls | 26¢ | 34¢ |
| No. 12, ¼ and ⅛ ℔ Balls | 35¢ | 33¢ |
| No. 18, ¼ and ⅛ ℔ Balls | 22¢ | 32¢ |
| No. 24, ¼ and ⅛ ℔ Balls | 32¢ | 32¢ |
| No. 36, ¼ and ⅛ ℔ Balls | 20¢ | 31¢ |

No. 264, Mattress, ¼ and ⅛ ℔ Balls.52@54¢
Chalk Line, Cotton, ⅛ ℔ Balls.....25¢
Mason Line, Linen, ⅛ ℔ Balls.....55¢
2-Ply Hemp, ¼ and ⅛ ℔ Balls (Spring Twine).....15¼¢
3-Ply Hemp, 1 ℔ Balls.....16¢@16¼¢
3-Ply Hemp, 1½ ℔ Balls.....15¢@15¼¢
Cotton Wrapping, 5 Balls to ℔ ..15¢@16¢
2, 3, 4 and 5-Ply Jute, ⅛ ℔ Balls.....10¢
Wool.....6¼¢@6¾¢
Paper.....13¢@14¢
Cotton Mops, 6, 9, 12 and 15 ℔ to doz..18¢

**Vises—**

Solid Box.....50&10@50&10&5%

*Parallel—*

Fisher & Norris Double Screw.....15&10%
Stephens'.....25@30%
Parker's.....20@25%
Wilson's.....55%
Howard's.....40%
Bonney's.....40&10%
Millers Falls.....40@40&10%
Trenton.....40&5@40&10%
Merrill's.....15@20%
Sargent's.....60&10&10%
Backus and Union.....40%
Double Screw Leg.....15&10%
Prentiss.....20@25%
Simpson's Adjustable.....40%
Moore's.....30%
Massey Quick Action.....30 @ 25 %

*Saw Filers—*

Bonney's, Nos. 2 & 3, $15.00.....40&10%
Stearn's.....33⅓&10@33⅓&10&10%
Stearn's Silent Saw Vises.....33⅓@35%
Sargent's.....60%&10%
Hopkins'.....₩ doz $17.50, 10%
Reading.....40&10%
Wentworth.....50&10%

*Miscellaneous.*

Combination Hand Vises.....₩ gr $42.00
Cowell Hand Vises.....20%
Bauer's Pipe Vises.....10%
Cincinnati.....35&10%
Enterprise Pipe Vises, each.....$3.00
Massey Combination Pipe.....40 %

**Wagon Boxes—See Boxes, Wagon.**

**Washer Cutters—See Cutters Washer.**

**Wagon Jacks—See Jacks, Wagon.**

**Ware, Hollow, Enameled, &c.**

*Cast Iron, Hollow—*

Stove Hollow-Ware—
Ground.....60&10%
Unground.....60&10&10%
White Enameled-Ware—
Maslin Kettles.....70%
Boilers and Saucepans..40&10@50&5%
Tinned Boilers and S'pans.40&10@50&5%
Rustless Hollow-Ware.....50@50&5%
Gray Enameled-Ware—
Stove.....50%
Maslin Kettles.....60&10&10%
Boilers and Saucepans.....40&5%

*Enameled—*

Agate and Granite Ware, list Jan. 1, 1889.....33⅓&10%
Ironclad Enameled Ware...dis 33⅓&10%

*Kettles—*

Galvanized Tea-Kettles—
Inch.... 6 7 8 9
Each....55¢ 60¢ 75¢

*Standard Fiber—*

| | Per Dozen. Plain. | Dec'r'd |
|---|---|---|
| Wash-Basins, 10¼ in. | $2.00 | $2.25 |
| Wash-Basins, 12 in. | 2.25 | 2.75 |
| Keelers, 11¼ in. | | 4.00 |
| Cuspidors | | 3.00 |
| Spittoons, "Daisy," 8 in. | 4.00 | 4.50 |
| Peck Measure | 4.00 | |
| Half-peck Measure | 3.50 | |

See also Pails.

*Indurated Fiber—25%*

Spittoons, No. 2, ₩ dos.....$9.00
Basins, Ringed, ₩ dos., No. 2.....$3.00
Washtubs, Nested, Nos. 0, 1, 2 and 3 (4 pieces), ₩ nest.....$7.50
Keelers, Nested, Nos. 1, 2, 3 and 4 (4 pieces), ₩ nest.....$3.70
Butter Bowls 15, 17 and 19-inch (3 pieces), ₩ nest.....$2.25
Liquid Measures, pt., qt., 2 qt. and funnell (4 pieces) ₩ set.....$3.00
See also Pails.

*Silver Plated, Hollow—*

4 mo. or 5 % cash in 30 days.

Reed & Barton.....
Meriden Britannia Co.....
Simpson, Hall, Miller & Co.....
Rogers & Brother.....
Hartford Silver Plate Co.....
William Rogers Mfg. Co.....
} 40&5%

**Washers—**

| Size hole | 5-16 | ⅜ | ½ | ⅝ to 1¾ |
|---|---|---|---|---|
| Washers | 6 | 5 | 3.50¢ | 3 |

In lots less than 200 ℔, ₩ ℔, add ¼¢, 5-℔ boxes 1¢ to list.

**Wedges—**

Iron.....₩ ℔ 3½¢
Steel.....₩ ℔ 3½¢

**Weights, Sash—**

Solid Eyes.....₩ ton $1@$0

**Well Buckets, Galvanized See Buckets, Well, Galvanized.**

**Wheels, Well.**

8 in., $2.25; 10 in., $2.70; 12 in., $3.2[illegible]

**Wire and Wire Goods—**

*Iron—*

Market,
Br. & Ann., Nos. 0 to 18.....77½%
Cop'd, Nos. 0 to 18.....75%
Galv., Nos. 0 to 18.....67½%
Tin'd, Tinned list Nos. 0 to 18.....67½%
Stone,
Br. and Ann'd, Nos. 16 to 18....77½%
Bright and Ann'd, Nos. 19 to 26.....80%
Br. and Ann'd, Nos. 27 to 30.....82½%
Tinned.....
Tinned Broom Wire, 18 to 21, ₩ ℔.....5¢
Galvanized Fence, Nos. 8 and 9.....70%
Annealed Fence, Nos. 8 and 9.....80%
Annealed Grape, Nos. 10 to 14.....80%
Brass, list Jan. 18, 1884.....35%
Copper, list Jan. 18, 1884.....35%
Barb Fence.....See Trade Report
Annealed Wire on Spools.....50%
Mallin's Steel and Tin'd on Spools.....55%
Mallin's Brass and Cop. on Spools.....45%
Tate's Spooled, Tinned and Annealed.55%
Tate's Spooled Cop. and Brass.....45%
Cast Steel Wire.....50%
Stubs' Steel Wire.....$6.00 to 8. 30%
Steel Music Wire, 12 to 30...60@70¢ ₩ ℔
Wire Clothes Lines, see Lines.
Wire Picture Cord see cord.

*Bright Wire Goods—*

Standard list.....80&10%

*Wire Cloth and Netting.*

Painted Screen Cloth, good quality, ₩ 100 sq. ft., $1.40
Galvanized Wire Netting.....70&10@75%

**Wire Rope—See Rope, Wire.**

**Wrenches—**

American Adjustable.....40%
Baxter's Adjustable "S".....40&10@50%
Baxter's Diagonal.....40&10@50%
Coes' Genuine.....50&10%
Coes' "Mechanics'".....50&10@50%
Girard Standard.....65&10%
Lamson & Sessions' Engineers'..60&10%
Lamson & Sessions' Standard..70&10%
P. S. & W. Agricultural....
Girard Agricultural.....
Lamson & Sessions' Agric'l..
} 75&5 @ 75 &10%
Bemis & Call's
Fat. Combination.....35%
Merrick's Pattern.....35%
Brigg's Pattern.....35%
Cylinder or Gas Pipe.....40&10%
No. 3 Pipe.....50&10%
Aiken's Pocket (Bright).....$5.00, 50&10%
The Favorite Pocket.....₩ dos $4.00, 40%
Webster's Pat. Combination.....35%
Boardman's.....30&10%
Always Ready.....35&5%
Alligator.....50%
Donohue's Engineer.....30&10%
Acme, Bright.....50&5%
Acme, Nickeled.....40&5%
Hercules.....70%
Walker's.....55&5%
Diamond Steel.....55&5%
Cincinnati Brace Wrenches.....35&10%
Tafts' Vise Wrench.....55&10&5%

**Wringers, Clothes—**

List September 20, 1890, 2% cash.

**Wrought Goods—**

Staples, Hooks, &c., list Jan. 12, 1886, 85@85&10

# PAINTS, OILS AND COLORS.—Wholesale Prices.

**Animal and Vegetable Oils.**

| | | | |
|---|---|---|---|
| Linseed, City, raw..per gal. | 52 | @ | 60 |
| Linseed, City, boiled..... | 55 | @ | 63 |
| Linseed, Western, raw..... | .. | @ | 50 |
| Lard, City, Extra Winter.. | .. | @ | 56 |
| Lard, City, Prime..... | .. | @ | 52 |
| Lard, City, Extra No. 1.... | 45 | @ | 47½ |
| Lard, City, No. 1..... | 40 | @ | 42½ |
| Lard, Western, prime..... | 51 | @ | .. |
| Cotton-seed, Crude, prime, | 31 | @ | 32 |
| Cotton-seed, Crude, off grades..... | 25 | @ | 30 |
| Cotton-seed, Summer Yellow, prime..... | .. | @ | 38 |
| Cottonseed, Summer Yellow, off grades..... | 32 | @ | 36 |
| Sperm, Crude..... | 72 | @ | 73 |
| Sperm, Natural Spring..... | .. | @ | .. |
| Sperm, Bleached Spring..... | .. | @ | .. |
| Sperm, Natural Winter..... | 73 | @ | 75 |
| Sperm, Bleached Winter... | 78 | @ | 80 |
| Whale, Crude..... | .. | @ | 1 |
| Whale, Natural Winter..... | 54 | @ | 56 |
| Whale, Bleached Winter... | 56 | @ | 58 |
| Whale, Extra Bleached..... | 58 | @ | 60 |
| Sea Elephant, Bleached Winter..... | 63 | @ | 64 |
| Menhaden, Crude, Sound... | 25 | @ | .. |
| Menhaden, Crude, Southern | .. | @ | .. |
| Menhaden, Light Pressed.. | 27 | @ | .. |
| Menhaden, Bleached W'ter. | 29 | @ | .. |
| Menhaden, Extra Bleached | 31 | @ | 33 |
| Tallow, City, prime..... | 42 | @ | .. |
| Tallow, Western, prime.... | .. | @ | .. |
| Cocoanut, Ceylon..... | 6¾ | @ | 7¼ |
| Cocoanut, Cochin..... | 8¾ | @ | 9 |
| Cod, Domestic ..... | 40 | @ | 43 |
| Cod, Foreign..... | .. | @ | .. |
| Red Elaine..... | 36 | @ | 38 |
| Red Saponified.....₩ ℔ | 4¾ | @ | 5 |
| Bank.....per gal | 27 | @ | .. |
| Straits..... | 28 | @ | .. |
| Olive, Italian, bbls..... | 65 | @ | 70 |
| Neatsfoot, prime..... | 55 | @ | 65 |
| Palm, prime, Lagos....₩ ℔ | 6 | @ | 6¼ |

**Mineral Oils.**

| | | | |
|---|---|---|---|
| Black, 20 gravity, 25 @ 30 cold test.....per gal | 7½ | @ | 8 |
| Black, 20 gravity, 15 cold test..... | 8½ | @ | 9 |
| Black, 20 gravity, summer. | 6½ | @ | 7 |
| Cylinder light, filtered..... | 15 | @ | 20 |
| Cylinder, dark, filtered .... | 12 | @ | 15 |
| Cylinder, dard, st'm refined | 10 | @ | 18 |
| Paraffine, 23¼ @ 24 gravity. | 13½ | @ | 14 |
| Paraffine, 25 gravity..... | 12½ | @ | 13 |
| Paraffine, 28 gravity..... | 9½ | @ | 10 |
| Paraffine, red, 21 @ 22 gr'ty | .. | @ | .. |
| Paraffine, red, 23½@23 gr'ty | 13 | @ | 14 |

**Paints and Colors.**

| | | | |
|---|---|---|---|
| Barytes, Foreign, ₩ ton. | $22.00 | @ | $24.00 |
| Barytes, Amer. floated... | 30.00 | @ | 32.00 |
| Barytes, Amer. No. 1.... | 19.00 | @ | 20.00 |
| Barytes, Amer. No. 2.... | 13.00 | @ | 16.00 |
| Barytes, Amer., No. 3.... | 11.00 | @ | 12.00 |
| Blue, Celestial.....₩ ℔ | 6 | @ | 8 |
| Blue, Chinese ..... | 50 | @ | 55 |
| Blue Prussian..... | 25 | @ | 40 |
| Blue, Ultramarine ..... | 8 | @ | 25 |
| Brown, Spanish ..... | ½ | @ | 1 |
| Brown, Vandyke, Amer.. | 3 | @ | 3½ |
| Brown, Vandyke, English | 6 | @ | 8 |
| Carmine, No. 40, in bulk. | 3.10 | @ | .. |
| Carmine, No. 40, in boxes or barrels ..... | 3.20 | @ | .. |
| Carmine, No. 40, in ounce bottles..... | 4.20 | @ | .. |
| Chalk, in bulk.....₩ ton. | 2.75 | @ | 3.00 |
| Chalk, in bbls..₩ 100 ℔. | 33 | @ | 40 |
| China Clay, English.... ₩ ton. | 13.00 | @ | 18.00 |
| Cobalt Oxide, prep'd.... | 2.90 | @ | .... |
| Cobalt Oxide, black.. .... lots 100℔ | 2.60 | @ | .... |
| Cobalt, Oxide, black..... less 100℔ | 2.65 | @ | .... |
| Green, Paris, in bulk..... | 14 | @ | 15½ |
| Green Paris, 170 @ 175 ℔ kegs..... | 14½ | @ | 15¾ |
| Green, Paris, small pack. | 16 | @ | 21¾ |
| Green, Chrome, ordinary | 5 | @ | 11 |
| Green, Chrome, pure.... | 22 | @ | 25 |
| Lead, Eng., B.B. white.... | 8½ | @ | 10 |
| Lead, Amn. White, dry or in oil: | | | |
| Kegs, lots less than 1000 ℔.. | | @ | 7¼ |
| Kegs, lots 1000 ℔ to 5 tons. | | @ | 6¾ |
| Kegs, lots 5 tons to 12 tons.. | | @ | 6¾ |
| Kegs, lots 12 tons and over.. | | @ | 6¼ |
| Lead White in oil 25 ℔ tin pails add to keg price. ..... | | @ | ⅛ |
| Lead, White, in oil, 12½ ℔ tin pails, add to keg price..... | | @ | 1 |
| Lead, White, in oil, 1 to 5 ℔ assorted tins, add to keg price. | | @ | 2½ |
| Lead, Red, bbls. and ½ bbls.... | 6¼ | @ | 7 |
| Lead, Red, kegs..... | 6¼ | @ | 7¼ |
| Litharge, kegs..... | 6½ | @ | 7¼ |
| Litharge, bbls. and ½ bbls. | 6¼ | @ | 7 |

TERMS, &c.—Lead and Litharge.—On lots of 1000 ℔ or over, 60 days' time or 2½ % discount for cash if paid within 15 days of date of invoice.

| | | | |
|---|---|---|---|
| Ocher, Rochelle..... | 1.35 | @ | 1¾ |
| Ocher, French Washed..... | 1¼ | @ | 2½ |
| Ocher, German Washed.... | 1¼ | @ | 2 |
| Ocher, American..... | ¾ | @ | 1¼ |
| Orange Mineral, English... | 9 | @ | 9½ |
| Orange Mineral, French.... | 10 | @ | 10½ |
| Orange Mineral, German .. | 9½ | @ | 10 |
| Orange Mineral, American. | 8 | @ | 8½ |
| Paris White, English Cliff-stone..... | 1.00 | @ | 1.15 |
| Paris White, American..... | 70 | @ | 75 |
| Red, Indian, English..... | 5½ | @ | 7 |
| Red, Indian, American.... | 2 | @ | 4½ |
| Red, Turkey..... | 9 | @ | 14 |
| Red, Tuscan ..... | 9 | @ | 11 |
| Red, Venetian, American.. ₩ 100 ℔. | 1.00 | @ | 1.25 |
| Red, Venetian, English.... | 1.00 | @ | 1.50 |
| Sienna, Italian, Burnt and Powd.₩ ℔ ..... | 5 | @ | 6¾ |
| Sienna, Ital., Burnt Lumps | 1½ | @ | 3½ |
| Sienna, Ital., Raw, Powd.. | 5 | @ | 6¾ |
| Sienna, Ital., Raw Lumps.. | 2 | @ | 3½ |
| Sienna, American, Raw.... | 1½ | @ | 1¾ |
| Sienna, American, Burnt and Powdered..... | 1½ | @ | 1¾ |
| Talc, French ..... | 1½ | @ | 1½ |
| Talc, American..... | 1 | @ | 1¼ |
| Terra Alba, Fr'ch. ₩ 100 ℔ | 90 | @ | 1.00 |
| Terra Alba, English ..... | 50 | @ | 60 |
| Terra Alba, American No.1 | 70 | @ | 75 |
| Terra Alba, American No.2 | 40 | @ | 50 |
| Umber, Turkey, Bnt. and Powd.,..... ₩ ℔ | 3½ | @ | 4 |
| Umber, Turkey Bnt.Ln | 2½ | @ | 3 |
| Umber, Turkey, Raw and Powdered..... | 3½ | @ | .. |
| Umber Turkey, R'w Lmps | 2½ | @ | 2¾ |
| Umber, Turkey, Bnt. Amer. | 1½ | @ | 1¾ |
| Umber, Turkey, R'w Amer. | 1½ | @ | 1¾ |
| Yellow, Chrome..... | 10 | @ | 25 |
| Vermilion Americ. Lead.. | 11½ | @ | 17 |
| Vermilion, Quicks'er, bulk. | 64 | @ | 66 |
| Vermilion, Quicks'er, bags. | 65 | @ | 67 |
| Vermilion, Quicksilver, smaller pkgs..... | 69 | @ | 71 |
| Vermilion English Imprt | 80 | @ | 85 |
| Vermilion, Imitation, Eng. | 8 | @ | 25 |
| Vermilion, Trieste..... | 87½ | @ | 90 |
| Vermilion, Chinese..... | 90 | @ | 95 |
| Whiting, Common. ₩ 100 ℔ | 40 | @ | 45 |
| Whiting, Gilders'..... | 50 | @ | 55 |
| Zinc, American, dry.....₩ ℔ | 4¾ | @ | 5 |
| Zinc, French, Red Seal.... | .. | @ | 8½ |
| Zinc, French, Green Seal.. | .. | @ | 8½ |
| Zinc, French, V. M. X..... | .. | @ | 7 |
| Zinc, Antwerp, Red Seal... | .. | @ | 7¾ |
| Zinc, Antwerp, Green Seal | .. | @ | 8½ |
| Zinc, German, L. Z. O.... | .. | @ | 6¾ |
| Zinc, V. M. in Poppy Oil, G. Seal, lots of 1 ton and over..... | 10¾ | @ | 11¾ |
| lots less than 1 ton.... | 11 | @ | 11¾ |
| Zinc, V. M. in Poppy Oil, Red Seal,..... | .. | @ | .. |
| lots of 1 ton and over.... | 10 | @ | 10¾ |
| Lots of less than 1 ton.... | 10¼ | @ | 10¾ |

DISCOUNTS.—French Zinc.—Discounts to buyers of 10- bbl. lots of one or assorted grades, 1 %; 25 bbls, 2 %, 50 bbls, 4 %. No discount allowed on less than bbl. lots.

**Colors in Oil.**

| | | | |
|---|---|---|---|
| Blue, Chinese.....₩ ℔ | 35 | @ | 40 |
| Blue, Prussian..... | 39 | @ | 45 |
| Blue, Ultramarine..... | 12 | @ | 13 |
| Brown, Vandyke..... | 7 | @ | 12 |
| Green, Chrome..... | 8 | @ | 13 |
| Green, Paris..... | 16 | @ | 18½ |
| Sienna, Raw..... | 7 | @ | 14 |
| Sienna, Burut..... | 7 | @ | 14 |
| Umber Raw..... | 7 | @ | 10 |
| Umber, Burnt ..... | 7 | @ | 10 |

**Putty.**

| | | | |
|---|---|---|---|
| In wooden pails..... | .... | @ | .01¾ |
| In tin cans..... | .02 | @ | .02½ |
| In bladders..... | .02 | @ | .02¼ |

**Spirits Turpentine.**

| | | | |
|---|---|---|---|
| In regular bbls..... | 39½ | @ | .. |
| In machine bbls..... | 39½ | @ | .. |

**Glue.**

| | | | |
|---|---|---|---|
| Low Grade.....₩ ℔ | 8 | @ | 10 |
| Cabinet..... | 12 | @ | 14 |
| Medium White..... | 13 | @ | 15 |
| Extra White..... | 17 | @ | 20 |
| French..... | 10 | @ | 22 |
| English..... | 10 | @ | 14 |
| Irish..... | 12 | @ | . |

# CURRENT METAL PRICES.

## JUNE 24, 1891.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market reports.

### IRON AND STEEL.

#### Bar Iron from Store.

| | |
|---|---|
| Common Iron : | |
| ⅜ to 2 in. round and square.. 1 to 6 in. x ⅜ to 1 in..... .... | ₩ lb 2.00 @ 2.10¢ |
| Refined Iron : | |
| ⅜ to 2 in. round and square.. 1 to 4 in. x ⅜ to 1½ in..... 4½ to 6 in. x ⅜ to 1 in..... | ₩ lb 2.10 @ 2.30¢ |
| 1 to 6 in. x ¼ and 5-16 ..... | ₩ lb 2.30 @ 2.50¢ |
| Rods—⅜ and 11-16 round and sq.. | ₩ lb 2.20 @ 2.40¢ |
| Bands—1 to 6 x 3-16 to No. 12.... | ₩ lb 2.40 @ 2.60¢ |
| "Burden Best" Iron, base price.. | ₩ lb..... 3.00¢ |
| Burden's "H. B. & S." Iron, base price..... | ₩ lb..... 2 80¢ |
| "Ulster"..... | ₩ lb..... 3.00¢ |
| Norway Bars ..... | 4.00¢ |
| Norway Shapes..... | 5.00¢ |

#### Merchant Steel from Store.

| | Per pound. |
|---|---|
| Open-Hearth and Bessemer Machinery, Toe Calk, Tire and Sleigh Shoe, base price in small lots..... | 2½¢ |
| Best Cast Steel, base price in small lots | 8 ¢ |
| Best Cast Steel Machinery, base price in small lots..... | 5¢ |

#### Sheet Iron from Store.

| | Common American. | | R. G. | Cleaned. |
|---|---|---|---|---|
| 10 to 15.....₩ lb | 3.00 @ | 3.00¢ | 3.35 @ | .....¢ |
| 17 to 20.....₩ lb | 3.15 @ | 3.25¢ | 3.35 @ | 3.75 ¢ |
| 21 to 24.....₩ lb | 3.25 @ | 3.35¢ | 3.60 @ | .....¢ |
| 25 and 26....₩ lb | 3.35 @ | .... | 3.60 @ | .....¢ |
| 27..... ...₩ lb | 3.50 @ | 3.85¢ | 3.85 @ | .....¢ |
| 28.....₩ lb | 3.65 @ | .....¢ | 4.10 @ | .....¢ |
| | B. B. | | | 33 qual. |
| Galv'd, 14 to 20, ₩ lb, | 4.75 @ | ... | 4.60 @ | .....¢ |
| Galv'd, 21 to 24, ₩ lb, | 5.12 @ | ... | 5.00 @ | .....¢ |
| Galv'd, 25 to 26, ₩ lb, | 5.50 @ | ... | 5.35 @ | .....¢ |
| Galv'd, 27..... ₩ lb, | 5 90 @ | ... | 5.70 @ | .....¢ |
| Galv'd, 28..... ₩ lb, | 6.25 @ | ... | 6.10 @ | .....¢ |
| Patent Planished..... | ₩ lb | A 10¢ | | B, 9¢ |
| Russia..... | ₩ lb | 10½¢ @ | | 11¢ |
| American Cold Rolled B. B..... | ₩ lb | 5¢ @ | | 7¢ |
| Craig Polished Sheet Steel..... | ₩ lb, | | | 8½¢ |

#### English Steel from Store.

| | |
|---|---|
| Best Cast ..... | ₩ lb 15 ¢ |
| Extra Cast..... ..... | ₩ lb 16½ @ 17 ¢ |
| Swaged, Cast..... | ₩ lb 16 ¢ |
| Best Double Shear..... | ₩ lb 15 ¢ |
| Blister, 1st quality ..... | ₩ lb 12 ¢ |
| German Steel, Best..... | ₩ lb 10 ¢ |
| 2d quality..... | ₩ lb 9 ¢ |
| 3d quality ..... | ₩ lb 8 ¢ |
| Sheet Cast Steel, 1st quality..... | ₩ lb 15 ¢ |
| 2d quality..... | ₩ lb 14 ¢ |
| 3d quality..... | ₩ lb 12½¢ |
| R. Mushet's "Special" ..... | ₩ lb 48 ¢ |
| " " "Titanic"..... | ₩ lb 20 ¢ |

### METALS.

#### Tin.

| | Per lb |
|---|---|
| Banca, Pigs..... | 23¢ |
| Straits, Pigs..... | 22¢ |
| Straits in Bars ..... | 24¢ |

#### Tin Plates.

| | | | Per box. |
|---|---|---|---|
| | *Charcoal Plates.—Bright.* | | |
| Holyn Grade..... | IC, 10 x 14.. .... | @ | $6.50 |
| " " | ... ....IC, 12 x 12.. .... | @ | 6.75 |
| " " | ..... IC, 14 x 20.. .... | @ | 6.50 |
| " " | .....IC, 20 x 28.. .... | @ | 13 20 |
| " " | .... ...IX, 10 x 14.. ... | @ | 8.00 |
| " " | .... ...IX, 12 x 12.. .... | @ | 8 25 |
| " " | ..... ..IX, 14 x 20.. .... | @ | 8 00 |
| " " | .....IX, 20 x 28.. .... | @ | 16 00 |
| " " | .....DC, 12½ x 17.. .... | @ | 6 00 |
| " " | .....DX, 12½ x 17.. .... | @ | 7.10 |
| Galland Grade..... | IC, 10 x 14.. .... | @ | 6.50 |
| " " | .....IC, 12 x 12.. .... | @ | 6 75 |
| " " | .....IC, 14 x 20.. .... | @ | 6.40 |
| " " | .....IX, 10 x 14.. .... | @ | 7 65 |
| " " | .....IX, 12 x 12.. .... | @ | 8.00 |
| " " | .....IX 14 x 20. .... | @ | 7.65 |
| Allaway Grade..... | IC, 10 x 14.. .... | @ | 6.15 |
| " " | .. ...IC, 12 x 12.. .... | @ | 6.30 |
| " " | .....IC, 14 x 20.. .... | @ | 6.15 |
| " " | .....IC, 20 x 28.. .... | @ | 12.00 |
| " " | .....IX, 10 x 14.. .... | @ | 7.30 |
| " " | .....IX, 12 x 12.. .... | @ | 7.60 |
| " | ..... IX, 14 x 20.. .... | @ | 7.30 |
| " | .....IX, 20 x 28.. .... | @ | 14.60 |
| " " | ...DC, 12½ x 17.. .... | @ | 5.80 |
| " " | ...DX, 12½ x 17.. 6.00 | @ | 6.80 |
| | *Coke Plates.—Bright.* | | |
| Steel Coke.—IC, 10 x 14, 14 x 20,. .... | | @ | $5.70 |
| 10 x 20.. .... | | @ | 7.85 |
| 20 x 28.. .... | | @ | 11.20 |
| IX, 10 x 14, 14 x 20.. .... | | @ | 6.60 |
| BV Grade.—IC, 10 x 14, 14 x 20.. .... | | @ | 5.70 |
| | *Charcoal Plates.—Terne.* | | |
| Dean Grade.—IC, 14 x 20.. ..... .... | | @ | $5.45 |
| 20 x 28.. .... | | @ | 10.60 |
| IX, 14 x 20..... .... | | @ | 6.20 |
| 20 x 28..... .... | | @ | 12.35 |
| Abecarne Grade.—IC, 14 x 20... .... | | @ | 5.25 |
| 20 x 28... .... | | @ | 10.60 |
| IX, 14 x 20.... .... | | @ | 6.35 |
| 20 x 28. .... | | @ | 12.35 |

*Tin Boiler Plates.*

| | |
|---|---|
| IXX, 14 x 26.....112 sheets..... .... | @ $13.50 |
| IXX, 14 x 28.....112 sheets.... .... | @ 13.75 |
| IXX, 14 x 31... ....112 sheets ..... .... | @ 15.25 |

#### Copper.

Duty: Pig, Bar and Ingot, 1½¢; Old Copper, 1¢ ₩ lb. Manufactured (including all articles of which Copper is a component of chief value), 35 ℅ ad valorem.

*Ingot.*

| | |
|---|---|
| Lake... ..... ..... | @ 15 ¢ |
| Ansonia Grade Arizona ... ..... .. . | @ 13¼¢ |
| Ansonia Grade Casting .. . . .... ..... | @ 12¼¢ |

*Sheet and Bolt.*

Prices adopted by the Association of Copper Manufacturers of the United States, December 5, 1890, being quotations for all sized lots.

| Not wider than | Not longer than | And longer than | Weights per square foot and prices per pound. Over 64 oz. | 33 to 64 oz. | 16 to 32 oz. | 14 to 16 oz. | 12 to 14 oz. | 10 to 12 oz. | 8 to 10 oz. | Less than 8 oz. |
|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 72 | | 22 | 22 | 22 | 23 | 24 | 25 | 28 | 30 |
| 30 | | 72 | 22 | 22 | 23 | 25 | 27 | 31 | .... | .... |
| 36 | 96 | | 22 | 22 | 22 | 24 | 26 | 30 | 33 | .... |
| 36 | | 96 | 22 | 22 | 23 | 25 | 27 | 31 | 35 | .... |
| 48 | 96 | | 22 | 22 | 24 | 26 | 28 | 32 | .... | .... |
| 48 | | 96 | 22 | 22 | 25 | 27 | 29 | 33 | .... | .... |
| 60 | 96 | | 22 | 22 | 27 | 29 | 34 | .... | .... | .... |
| 60 | | 96 | 22 | 23 | 28 | .... | .... | .... | .... | .... |
| 84 | 96 | | 23 | 24 | .... | .... | .... | .... | .... | .... |
| 84 | | 96 | 24 | 25 | .... | .... | .... | .... | .... | .... |
| Over 84 in. wide | | | 25 | 27 | .... | .... | .... | .... | .... | .... |

| | | | | |
|---|---|---|---|---|
| All Bath Tub Sheets.... | 16 oz. | 14 oz. | 12 oz. | 10 oz. |
| Per pound..... | $0.27 | 0.29 | 0.31 | 0.35 |

Bolt Copper, ¼ inch diameter and over, per pound..... 23¢

Circles, 60 inches in diameter and less, 3 cents per pound advance over lowest prices of Sheet Copper of the same thickness.

*Copper Bottoms, Pits and Flats.*

| | Per pound. |
|---|---|
| 14 ounce to square foot and heavier..... | 26¢ |
| 12 ounce and up to 14 ounce to square foot..... | 27¢ |
| 10 ounce and up to 12 ounce..... | 29¢ |
| Lighter than 10 ounce..... | 32¢ |

Circles less than 8 inches diameter 2 cents per pound additional.

Circles over 13 inches diameter are not classed as Copper Bottoms.

*Tinning.*

| | |
|---|---|
| Tinning sheets on one side, 10, 12 and 14 x 48 each..... | 8¢ |
| Tinning sheets on one side, 30 x 60 each..... | 30¢ |
| For tinning boiler sizes, 9 in. (sheets 14 in. x 60 in.), each..... | 15¢ |
| For tinning boiler sizes, 8 in. (sheets 14 in. x 56 in.), each ..... | 12¢ |
| For tinning boiler sizes, 7 in. (sheets 14 in. x 52 in.) each..... | 12¢ |
| Tinning sheets on one side, other sizes, per square foot..... | 2½¢ |
| For tinning both sides double the above prices. | |

*Planished Brass and Copper.*

14 x 48, 14 x 52, 14 x 56, 14 x 60 in.

14 and 16 oz. and heavier..33¢. By the case...32¢ ₩ lb
12 oz. and lighter.....35¢. By the case...34¢ ₩ lb

24 x 48 and 30 x 60.

14 and 16 oz. and heavier..36¢. 12 oz.....39¢ ₩ lb

*Seamless Brass and Copper Tubes.*

| O. G. | N. G. | ⅜ | ½ | ⅝ | ¾ | ⅞ | 1 | 1⅛ |
|---|---|---|---|---|---|---|---|---|
| 8-14 | 6-12 | 37 | 33 | 30 | 29 | 28 | 27 | 24 |
| 15 | 13 | 38 | 34 | 31 | 30 | 29 | 28 | 25 |
| 16 | 14 | 39 | 34 | 32 | 31 | 30 | 29 | 25 |
| 17 | 15 | 40 | 35 | 33 | 30 | 31 | 30 | 26 |
| 18 | 16 | 42 | 36 | 34 | 32 | 31 | 30 | 27 |
| 19 | 17 | 43 | 37 | 35 | 34 | 33 | 32 | 29 |
| 20 | 18-19 | 44 | 39 | 37 | 36 | 35 | 34 | 31 |
| 21 | 20 | 46 | 41 | 39 | 38 | 37 | 36 | 34 |
| 22 | 21 | 48 | 42 | 40 | 39 | 38 | 37 | 36 |
| 23 | 22 | 50 | 44 | 42 | 41 | 40 | 39 | 39 |
| 24 | 23 | 53 | 46 | 44 | 43 | 41 | 40 | 41 |
| 25 | 24 | 56 | 49 | 46 | 45 | 44 | 43 | 45 |

Copper Bronze and Gilding Tube, 3¢ ₩ lb additional.

*Brazed Brass Tubing.* (To No. 20, inclusive.

| | |
|---|---|
| Above 5-16 inch to 3 inch, inclusive ..... | 35¢ |
| Plain, above 3 inch..... | 45¢ |
| Plain, 5-16 inch..... | 45¢ |
| Plain, ¼ inch..... | 60¢ |
| Plain, 3-16 inch..... | $1.00 |
| Plain, ⅛ inch.... | 1.50 |
| Fancy Tubing, Brass, to No. 20, inclusive..... | 42¢ ₩ lb |
| Bronze Tubing, 3¢ ₩ lb more than Brass. | |
| Discount from list..... | 25 @ .. 5 |

#### Roll and Sheet Brass.

*(Brown & Sharpe Standard Gauge.)*

| Common High Brass: Wider than and including | in. 2 10 | in. 10 12 | in. 12 14 | in. 14 16 | in. 16 18 | in. 18 20 | in. 20 22 | in. 22 24 |
|---|---|---|---|---|---|---|---|---|
| To No. 20, inclusive... | .21 | .22 | .23 | .25 | .27 | .29 | .31 | .33 |
| Nos. 21, 22, 23 and 24. | .22 | .23 | .24 | .26 | .28 | .30 | .32 | .34 |
| Nos. 25 and 26..... | .22½ | .23½ | .24½ | .27 | .29 | .31 | .33 | .35 |
| Nos. 27 and 28..... | .23 | .24 | .25 | .28 | .30 | .32 | .34 | .36 |

| Common High Brass: Wider than and including | in. 24 26 | in. 26 28 | in. 28 30 | in. 30 32 | in. 32 34 | in. 34 36 | in. 36 38 | in. 38 40 |
|---|---|---|---|---|---|---|---|---|
| To No. 20, inclusive... | .36 | .39 | .42 | .46 | .50 | .55 | .60 | .65 |
| Nos. 21, 22, 23 and 24. | .37 | .40 | .43 | .47 | .51 | .56 | .61 | .66 |
| Nos. 25 and 26..... | .38 | .41 | .44 | .48 | .52 | .57 | .63 | .71 |
| Nos. 27 and 28..... | .39 | .42 | .45 | .49 | .53 | .58 | .66 | .76 |

#### Brass and Copper Wire.

| Old English guage standard. | Com. high brass. Per lb. | Low brass. Per lb. | Gildi'g br'ze & copper Per lb |
|---|---|---|---|
| All Nos. to No. 16, inclusive.... | $0.22 | $0 26 | $0.30 |
| No. 17 and No. 18..... | .23 | .27 | .31 |
| No. 19 " " 20..... | .24 | .28 | .32 |
| No. 21..... | .25 | .29 | .33 |
| No. 22..... | .26 | .30 | .34 |
| No. 23..... | .28 | .32 | .36 |
| No. 24..... | .30 | .34 | .38 |
| No. 25..... | .32 | .36 | .40 |
| No. 26..... | .35 | .39 | .43 |
| No. 27..... | .38 | .42 | .46 |
| No. 28..... | .42 | .46 | .51 |
| No. 29..... | .45 | .49 | .54 |
| No. 30..... | .48 | .52 | .58 |
| No. 31..... | .51 | .55 | .67 |
| No. 32..... | .55 | .59 | .72 |
| No. 33..... | .59 | .63 | .82 |
| No. 34..... | .64 | .68 | .95 |
| No. 35..... | .70 | .74 | 1.30 |
| No. 36..... | .76 | .80 | 1.50 |
| No. 37..... | 1.00 | 1.04 | 1.70 |
| No. 38..... | 1.30 | 1.34 | 2.00 |
| No. 39..... | 2.00 | 2.00 | 3.25 |
| No. 40..... | 2.60 | 2.60 | 5.75 |

Spring Wire, 2¢ ₩ lb advance.

#### Copper Belt and Hose Rivets and Burrs.

| | Per lb. | | Per lb. |
|---|---|---|---|
| No. 5..... | 49¢ | No. 11..... | 54¢ |
| No. 6..... | 49¢ | No. 12..... | 58¢ |
| No. 7..... | 49¢ | No. 13..... | 60¢ |
| No. 8... ..... | 50¢ | No. 14..... | 65¢ |
| No. 9..... | 52¢ | No. 15..... | 70¢ |
| No 10..... | 54¢ | | |

#### Tobin Bronze—Rods.

¼ inch and larger..... ...18¢ ₩ lb, net

#### Tobin Bronze—Piston Rods.

1¼ inch and smaller..... 19¢ ₩ lb, net
Over 1¼ inch.....21¢ ₩ lb, net

#### Spelter.

Duty: Pig, Bars and Plates, $1.50 ₩ 100 lb.

| | |
|---|---|
| Western Spelter ..... | 5¼¢ @ 6 ¢ |
| Bertha (pure) . ..... | 8¼¢ @ 9 ¢ |

#### Zinc.

Duty: Sheet, 2½¢ ₩ lb.

| | |
|---|---|
| 600 lb casks..... .. .. | 6¾¢ |
| Per lb ..... | 7½¢ |

#### Lead.

Duty: Pig, $2 ₩ 100 lb. Old Lead, 2¢ ₩ lb. Pipe and Sheets, 2½¢ ₩ lb.

| | |
|---|---|
| American ..... . .. ..... | 4¾¢ @ 5¢ |
| Bar..... ..... .... | ....5 ¢ @ 5¼¢ |
| Pipe, subject to trade discount.... | ..... ¶ |
| Tin-Lined Pipe, subject to trade discount.... | ..15¢ |
| Block Tin Pipes, subject to trade discount.... | 37½¢ |
| Sheet, subject to trade discount..... | 7½¢ |

#### Solder.

½ @ ½ (Guaranteed)... ..... '4¢
No. 1..... ..... 12¢
Extra Wiping..... .... .....11½¢ @ 1d¢

The prices of the many other qualities of Solder in the market indicated by private brands vary according to composition.

#### Antimony.

| | |
|---|---|
| Cookson..... . .... ..... | ₩ lb 16¢ @ 16½¢ |
| Hallett's. ..... ..... | " .... @ 16 ¢ |

### ALUMINUM.

#### Prices in Ingots.

In lots of 2000 lb and over..... ₩ lb $1.50

#### Old Metals.

*(Prices Paid in New York.*

| | | |
|---|---|---|
| Heavy Copper..... | ₩ lb | 12 ¢ |
| Light Copper..... | ₩ lb | 11 ¢ |
| Heavy Brass..... | ₩ lb | 10 ¢ |
| Light Brass..... | ₩ lb | 8 ¢ |
| Lead..... | ₩ lb | 4 ¢ |
| Tea Lead..... | ₩ lb | 3½¢ |
| Zinc..... | ₩ lb | 3 ¢ |
| No. 1 Pewter..... | ₩ lb | 16 ¢ |
| No. 2 Pewter..... | ₩ lb | 8 ¢ |
| Wrought Scrap Iron..... | ₩ gross ton | $19.00 |
| Heavy Cast Scrap..... | ₩ gross ton | 13.00 |
| Stove Plate Scrap..... | ₩ gross ton | 8.00 |
| Burnt Iron.... ..... | ₩ gross ton | 6.00 |

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# THE IRON AGE

**A Review of the Hardware, Iron and Metal Trades.**

Published every Thursday Morning by David Williams, Nos. 96, 98, 100 & 102 Reade St., New York

*Vol. XLVII: No. 1.* *New York, Thursday, January 1, 1891.* $4.50 a Year, including Postage Single Copies, Ten Cents.

**Reading Matter Contents.....page 37**
**Classified List of Advertisers..... " 123**
**Alphabetical Index to Advertisers. " 126**
**Advertising and Subscription Rates " 127**

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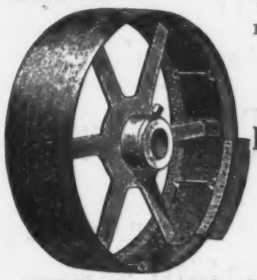

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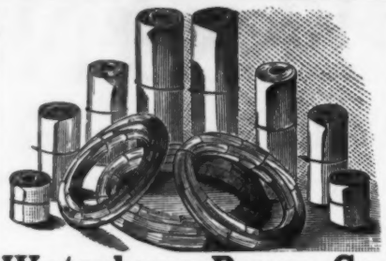

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Copper Bottoms
Bolts, Circles, &c., &c.

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Reading Matter Contents.....page 83
Classified List of Advertisers..... " 93
Alphabetical Index to Advertisers. " 96
Advertising and Subscription Rates " 97

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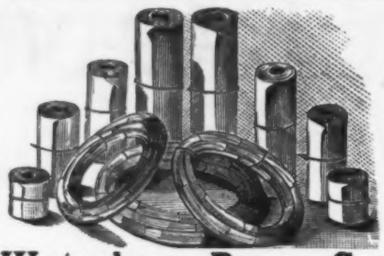
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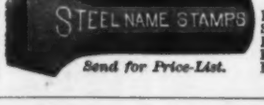

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Classified List of Advertisers..... " 103
Alphabetical Index to Advertisers. " 106
Advertising and Subscription Rates " 107

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10,000 OVENS IN CONNELLSVILLE REGION, PA.
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Ice Cream Freezers.
The best and most popular line on the market.
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For sale by all leading jobbers in hardware and house-furnishing goods.

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BROWN'S PATENT SEAMLESS DRAWN COPPER HOUSE BOILERS.

The Original Unvulcanized Packing
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Accept no packing as JENKINS' PACKING unless stamped with our "Trade-Mark."
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THE ALUMINUM BRASS AND BRONZE CO.,
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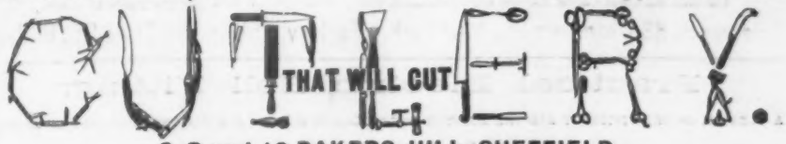


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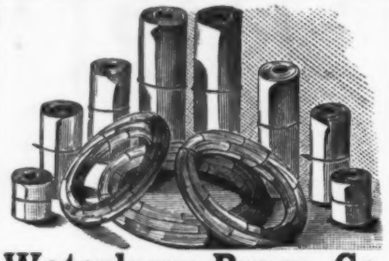
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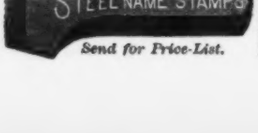

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A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by David Williams, Nos. 96, 98, 100 & 102 Read St., New York

*Vol.: XLVII. No. 4.* *New York, Thursday, January 22, 1891.* $4.50 a Year, including Postage Single Copies, Ten Cents.

Reading Matter Contents.....page 175
Classified List of Advertisers..... " 95
Alphabetical Index to Advertisers. " 98
Advertising and Subscription Rates " 99

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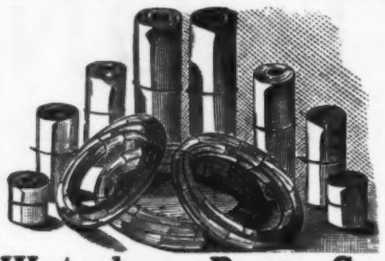
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*Vol.: XLVII. No. 5.* *New York, Thursday, January 29, 1891.* $4.50 a Year, including Postage. Single Copies, Ten Cents.

Reading Matter Contents.....page 221
Classified List of Advertisers.... " 93
Alphabetical Index to Advertisers " 96
Advertising and Subscription Rates " 97

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# THE IRON AGE

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by David Williams, Nos. 96, 98, 100 & 102 Reade St., New York

*Vol.: XLVII. No. 6.* *New York, Thursday, February 5, 1891.* $4.50 a Year, Including Postage. Single Copies, Ten Cents.

Reading Matter Contents.....page 267
Classified List of Advertisers.... " 135
Alphabetical Index to Advertisers " 138
Advertising and Subscription Rates " 139

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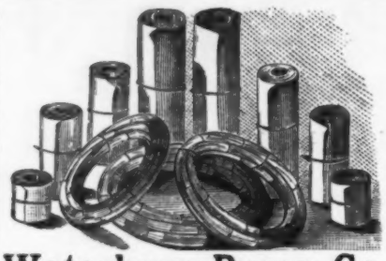
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Reading Matter Contents.....page 311
Classified List of Advertisers.... " 95
Alphabetical Index to Advertisers " 98
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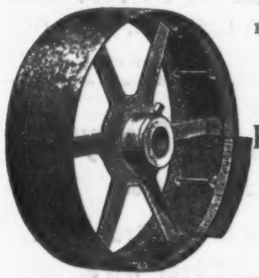

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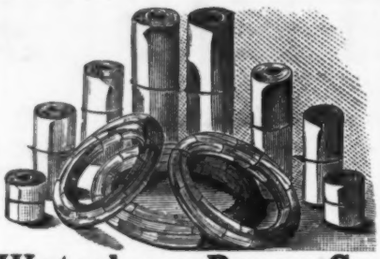
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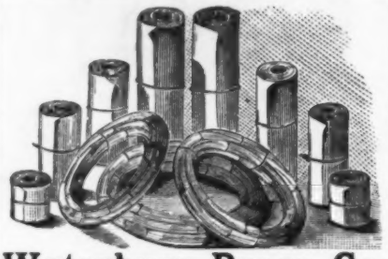
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Published every Thursday Morning by David Williams, Nos. 96, 98, 100 & 102 Reade St., New York

*Vol. XLVII: No. 9.* *New York, Thursday, February 26, 1891.* $4.50 a Year, including Postage. Single Copies, Ten Cents.

Reading Matter Contents.....page 411
Classified List of Advertisers.... " 97
Alphabetical Index to Advertisers " 100
Advertising and Subscription Rates " 101

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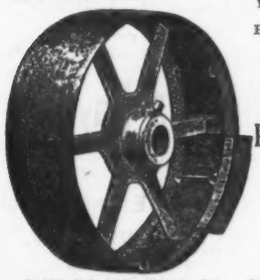

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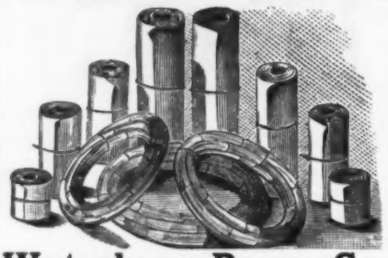

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*Vol. XLVII: No. 10.* *New York, Thursday, March 5, 1891.* $4.50 a Year, including Postage. Single Copies, Ten Cents.

Reading Matter Contents.....page 465
Classified List of Advertisers.... " 134
Alphabetical Index to Advertisers " 138
Advertising and Subscription Rates " 139

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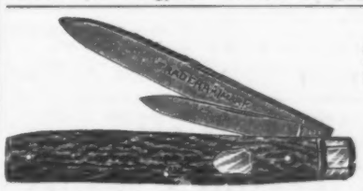


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# THE IRON AGE

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by David Williams, Nos. 96, 98, 100 & 102 Reade St., New York

*Vol. XLVII: No. 11.* *New York, Thursday, March 12, 1891.* $4.50 a Year, including Postage. Single Copies, Ten Cents.

Reading Matter Contents.....page 515
Classified List of Advertisers.... " 100
Alphabetical Index to Advertisers " 104
Advertising and Subscription Rates " 105

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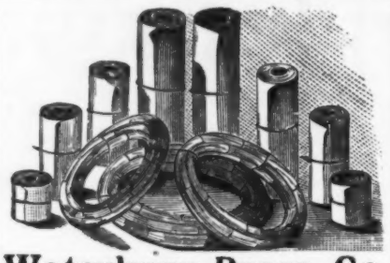
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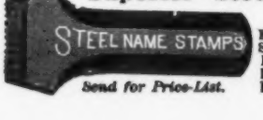

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Reading Matter Contents.....page 567
Classified List of Advertisers.... " 110
Alphabetical Index to Advertisers " 114
Advertising and Subscription Rates " 115

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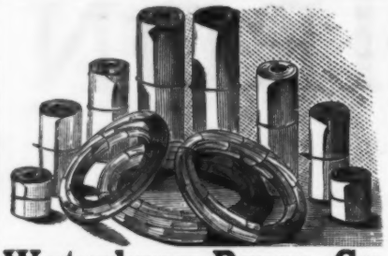
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A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by David Williams, Nos. 96, 98, 100 & 102 Reade St., New York

*Vol. XLVII: No. 14.* *New York, Thursday, April 2, 1891.* $4.50 a Year, including Postage. Single Copies, Ten Cents.

Reading Matter Contents.....page 667
Classified List of Advertisers.... " 136
Alphabetical Index to Advertisers " 140
Advertising and Subscription Rates " 141

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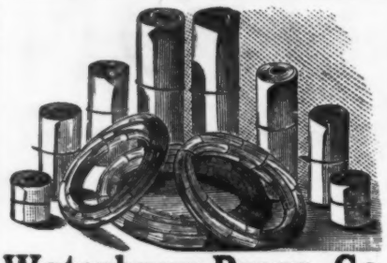
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Reading Matter Contents.....page 713
Classified List of Advertisers.... " 100
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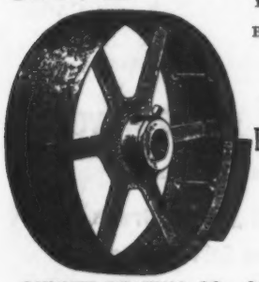

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# THE IRON AGE

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by David Williams, Nos. 96, 98, 100 & [illegible] New York

*Vol. XLVII: No. 17.* *New York, Thursday, April 23, 1891.* $4.50 a Year, [illegible] ing Postage. Single Copies, [illegible] Cents.

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Reading Matter Contents.....page 809
Classified List of Advertisers.... " 98
Alphabetical Index to Advertisers " 102
Advertising and Subscription Rates " 103

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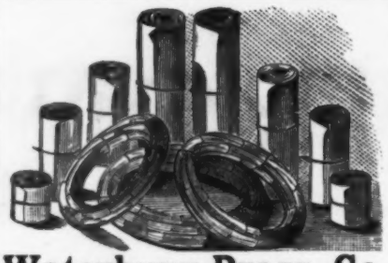
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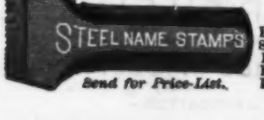

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Classified List of Advertisers.... " 100
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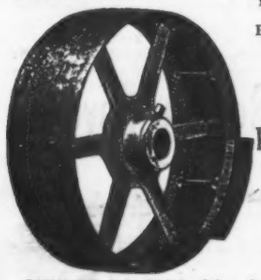

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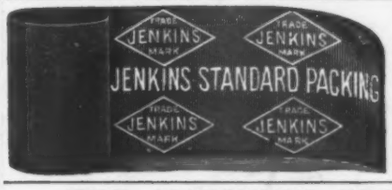


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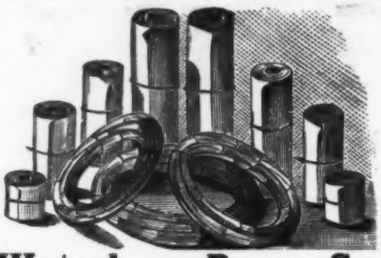

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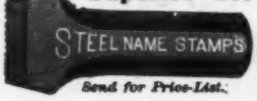

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A Review of the Hardware, Iron and Metal Trades

Published every Thursday Morning by David Williams, Nos. 96, 98, 100 & 102 Reade St., New York

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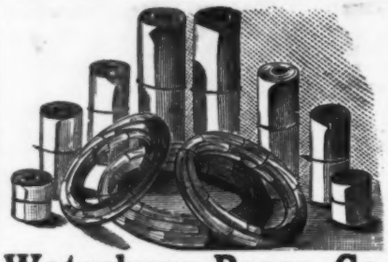
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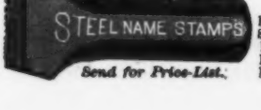

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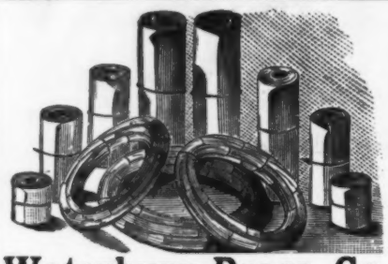
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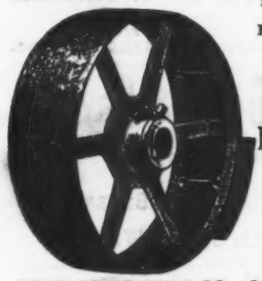

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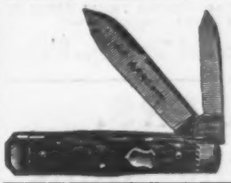

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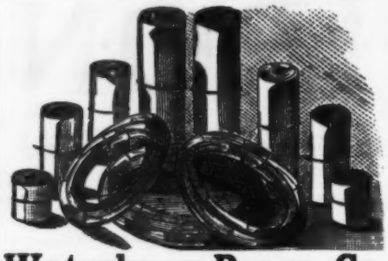
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A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by David Williams, Nos. 96, 98, 100 & 102 Reade St., New York

*Vol. XLVII: No. 22.* *New York, Thursday, May 28, 1891.* $4.50 a Year, including Postage. Single Copies, Ten Cents.

Reading Matter Contents.....page 1049
Classified List of Advertisers.... " 100
Alphabetical Index to Advertisers " 104
Advertising and Subscription Rates " 105

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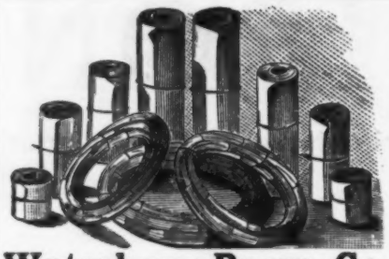
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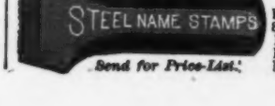

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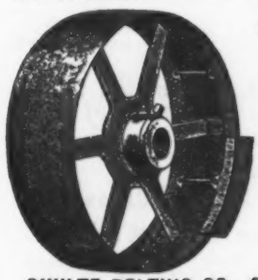

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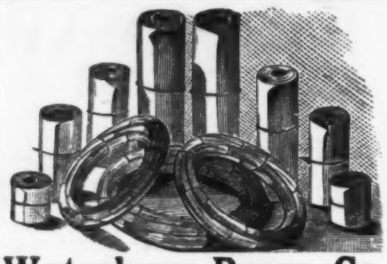
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# THE IRON AGE

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by David Williams, Nos. 96, 98, 100 & 102 Reade St., New York

*Vol. XLVII: No. 24.* *New York, Thursday, June 11, 1891.* $4.50 a Year, including Postage. Single Copies, Ten Cents.



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Advertising and Subscription Rates " 105

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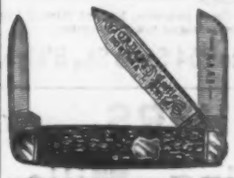

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Published every Thursday Morning by David Williams, Nos. 96, 98, 100 & 102 Reade St., New York

*Vol. XLVII: No. 25.* *New York, Thursday, June 18, 1891.* $4.50 a Year, including Postage. Single Copies, Ten Cents.

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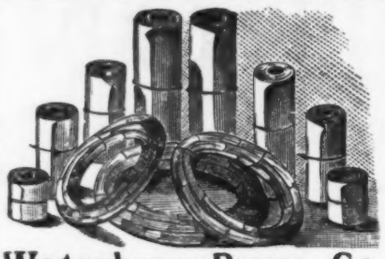
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A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by David Williams, Nos. 96, 98, 100 & 102 Reade St., New York

*Vol. XLVII: No. 26.* *New York, Thursday, June 25, 1891.* $4.50 a Year, including Postage. Single Copies, Ten Cents.

Reading Matter Contents.....page 1250
Classified List of Advertisers.... " 100
Alphabetical Index to Advertisers " 104
Advertising and Subscription Rates " 105

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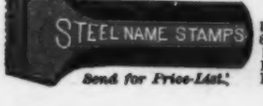

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